

ECLECTIC READINGS

HALF HOURS  
WITH  
MAMMALS



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# HALF HOURS

WITH

# THE MAMMALS

BY

CHARLES FREDERICK HOLDER

AUTHOR OF "ELEMENTS OF ZOÖLOGY," "STORIES OF ANIMAL  
LIFE," "LIFE OF LOUIS AGASSIZ," ETC.



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THE MAMMALS.

W. P. I

## PREFACE

AT the present day education is not complete without definite courses of nature study. We are living in an age of strenuous business life and activity, where the best equipped students along the various lines secure the best positions. Time was when zoölogy, botany, and kindred nature studies were classed with music and the so-called dead languages, and were taken up as incidentals or were employed in "mind training"; but to-day there are a thousand branches of trade and commerce which require knowledge that can be obtained only through nature study.

It is not necessary that the student, unless he intends to be a teacher of science or a professional naturalist, should be able to pass examinations in the abstruse classification of animals or delve into difficult anatomical studies. What the average student needs is a broad and general idea of animal life, its great divisions, and notably the relationship of the lower animals to man in an economic sense, the geographical distribution of animals, etc. It is vastly more important for the coming lumber merchant to know the relationship which forests bear to the water supply, and to have a general idea of forestry and the trees which make forests, than to be able to recite a long formula of classification or analysis, of value only to the advanced student or specialist. The future merchant who is to deal in alpaca, leather, dye, skins, hair, bone products, shell, pearl, lac, animal food products, ivory, whalebone, guano, feathers, and countless other articles

derived from animals is but poorly equipped for the struggle for business supremacy if he is not prepared by nature study, nature readings, and other practical instruction along these lines.

It is believed to-day by those who have given the subject the closest attention that the initial move of the teacher should be to call the attention of the child to the beauties of nature, the works of the Infinite, and thus early inculcate a habit of observation. The toys of the kindergarten should be fruits, flowers, shrubs, trees, pebbles, and vistas of mountains, hills, lakes, and streams, and nature study in some form should be continuous in school life.

In the following readings the story of the mammals has been presented on broad lines, divested of technicality, and at almost every step supplemented by forceful and explanatory illustrations as ocular aids to the reader. The subject has been divested of dry detail, and I have introduced notes and incidents, the results of personal observation and investigation in various lands and seas, and have given attention to the often neglected fauna of the Pacific coast as well as that of other regions.

While the volume is a supplementary reader, the matter is so arranged that it can be used by the teacher as a text-book, and the pupil who undertakes the various "half-hour readings" of this series will have covered in the main the ground of the ordinary text-book for intermediate grades in the form of readings. In a word, I have endeavored to make this volume a popular combined review and supplemental reader on the mammals.

CHARLES F. HOLDER.

PASADENA, CALIFORNIA.

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# HALF HOURS WITH THE MAMMALS

## I. MAMMALS

SOME of the greatest artists have become famous by painting scenes which typify the homes of farmers or ranchers. In these the life of the husbandman is depicted — beautiful fields with herds of cattle, flocks of sheep, or droves of horses. They portray outdoor life so distinctly that one can almost hear the lowing of the herds, and catch the rich odor of new-mown hay and clover.

Horses, cattle, sheep, and many others, composing the highest forms of animal life, are called mammals. They differ from all the rest of the animals in their method of caring for their progeny or young. These are nourished upon milk, a fluid secreted in the so-called mammary glands. Another peculiarity which separates the mammals from the birds, reptiles, and fishes is that the body is more or less covered with hair, instead of scales or feathers.

The skeleton of a mammal (Fig. 1) shows many differences from the lower forms. The bones, instead of being hollow and light, as in the birds, are solid and ponderous, the limb cavities being filled with marrow. The spinal column, or vertebræ, is long and apparently divided into several distinct regions, as the neck, the back, the loins, and the tail. As a rule, there are seven bones in the neck

region, this being true of both the giraffe and the whale. In the former each bone is lengthened out, while in the whale it is so very short that this huge creature, the largest of all animals, can hardly be said to have a neck at all. In the back there are usually thirteen bones, sometimes more. In the tail the bony links, or vertebræ, number from four to forty-five. The head is large and solid, form-

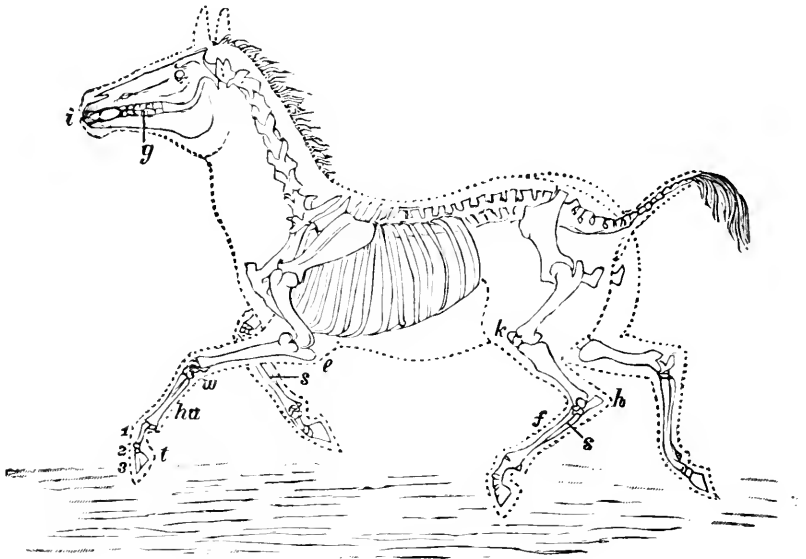


FIG. 1. — SKELETON OF A WILD ASS.

*i*, incisor teeth; *g*, grinding teeth, with the gap between the two sets as in all large grass feeders; *k*, knee; *h*, heel; *f*, foot; *t*, middle toe of three joints carrying the hoof; *s*, splint, or remains of one of the two lost toes; *e*, elbow; *w*, wrist; *ha*, hand bone; 1, 2, 3, joints of the middle toe.

ing a perfect and heavy covering for the brain. It moves easily from side to side, or up and down, permitting the animal to see in almost any direction. The lower jaw is composed of two pieces. It is joined directly to the skull, and not to a quadrate bone, as in the birds. The vertebræ of the back support the ribs, which curve downward and

form the staves to the barrel-shaped body, supporting and protecting the chest and vital organs. The tail is very useful in the horse and its kind, being provided with long hairs, hence a fly brush. In the whale it supports a prodigious fin. In the monkey it is developed into a hand which enables the animal to cling to trees. In many animals the tail is a very expressive organ, as in the dog. It wags when the animal is pleased, stiffens when it is enraged, while in the cat it becomes three or four times its usual size.

The limbs of the mammals, if we compare them with those of other animals, are particularly interesting. As a rule, there are four, except in the whales and manatees, in which only the front limbs are well developed. In the horse the knee (*k*) is found high up where it is least expected, the heel (*h*) being at the end of a very long foot upon which is the hoof, which is in reality the toe nail of a middle toe of three, two of which have disappeared in the course of time, one being represented by a splint (*s*, Fig. 2). In the ruminants, as the ox, there is a remarkable modi-

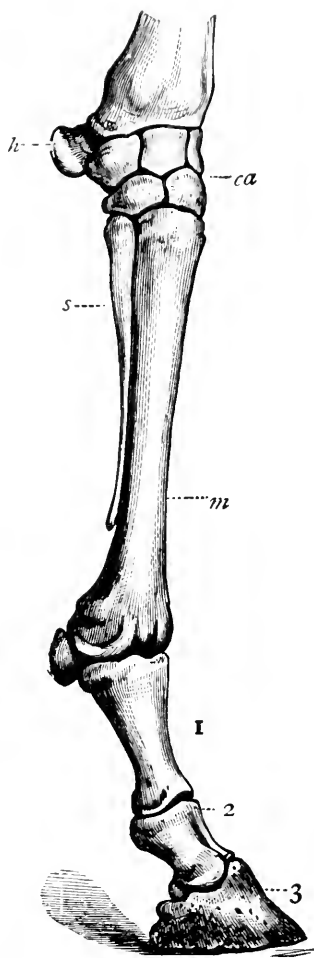


FIG. 2. — FORE LEG OF HORSE.

*ca*, carpus; *m*, metacarpal of the third digit; *s*, "splint bone," or rudimentary metacarpal; *I*, first phalanx, or "great pastern"; 2, second phalanx, or "small pastern"; 3, third phalanx, or "coffin bone."

fication of the foot, the digits numbering two, each bearing a hoof (Fig. 3).

Nearly all the mammals have teeth, to grind or tear their food (Fig. 4), those of the chimpanzee to some extent resembling those of man.

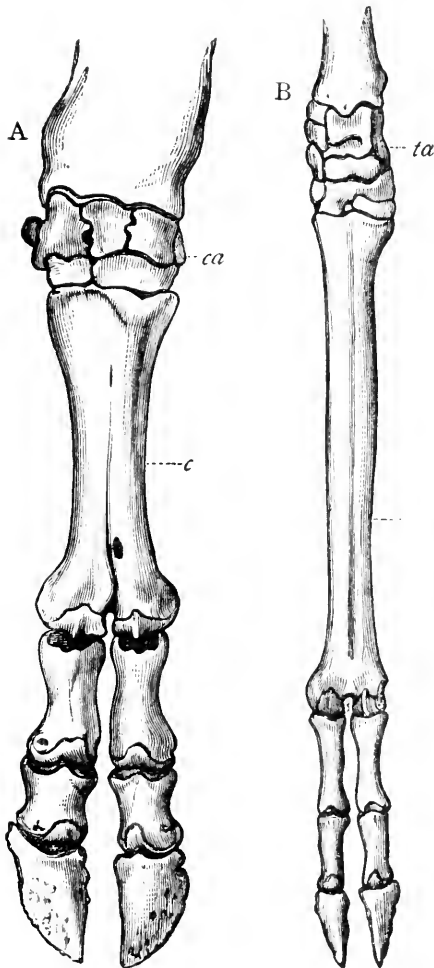


FIG. 3.—A, FORE LEG OF OX (*Bos taurus*). B, HIND LEG OF STAG (*Cervus elaphus*).

ca, carpus; ta, tarsus; c, "canon bone," composed of the united metacarpals or metatarsals of the third and fourth digits.

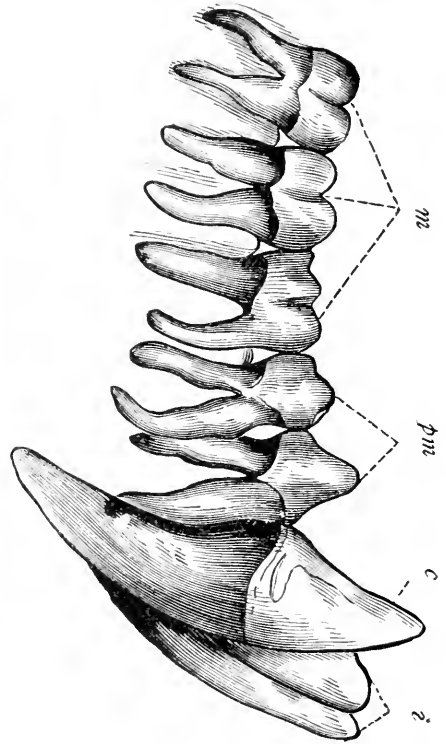


FIG. 4.—TEETH OF THE RIGHT SIDE OF THE LOWER JAW OF THE CHIMPANZEE (AFTER OWEN).

i, incisors; c, canine tooth; pm, præ-molars; m, molars.

The teeth of the elephant (Fig. 5) are enormous. In all mammals they have sockets. Perhaps the most remarkable development

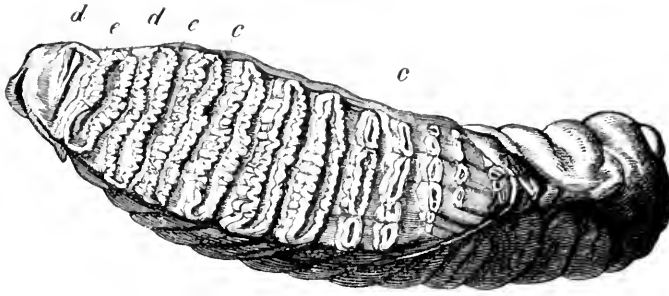


FIG. 5.—UPPER MOLAR TOOTH OF INDIAN ELEPHANT (*Elephas Indicus*).  
Showing transverse arrangement of dentine, *d*, with festooned border of enamel  
plates, *e*; *c*, cement; one third natural size.

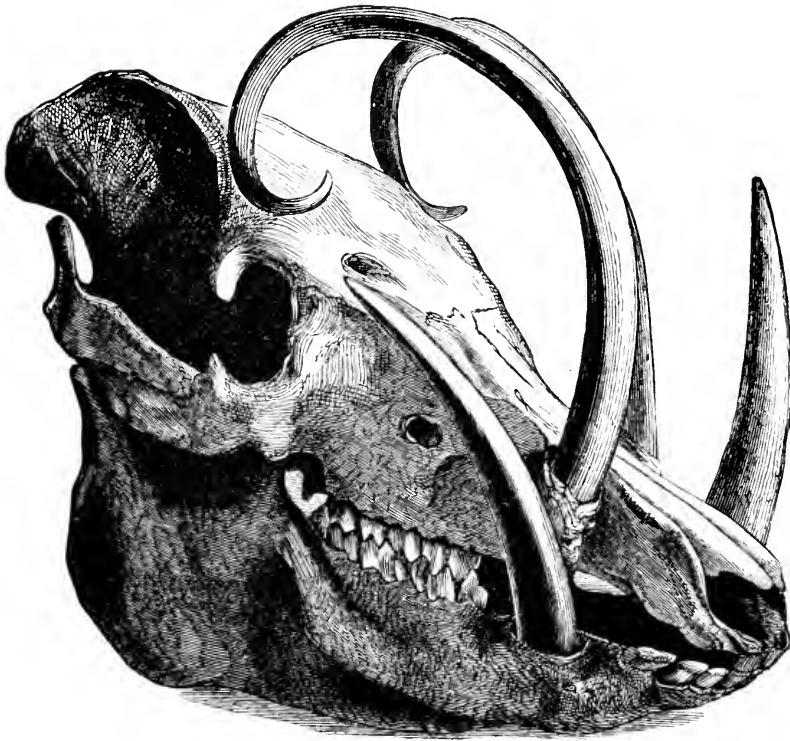


FIG. 6.—SKULL OF THE BABIRUSA, OR MALAYAN HOG.  
Showing growth and curvature of the canines.

of teeth is seen in the mammoth, in which the tusks were sometimes thirteen feet long and weighed three hundred pounds. The teeth of the hog, babirusa (Fig. 6), show a

strange and abnormal development, being in the case of the upper ones useless. Instances have been known in which these strange tusks turned and grew into the flesh.

The anatomy of the mammals (Fig. 7) is interesting. Food taken in at the mouth is chewed or ground up by the teeth, mixed with saliva. Thence it passes down the esophagus (*g*) into the stomach (*h*). Here it is mixed

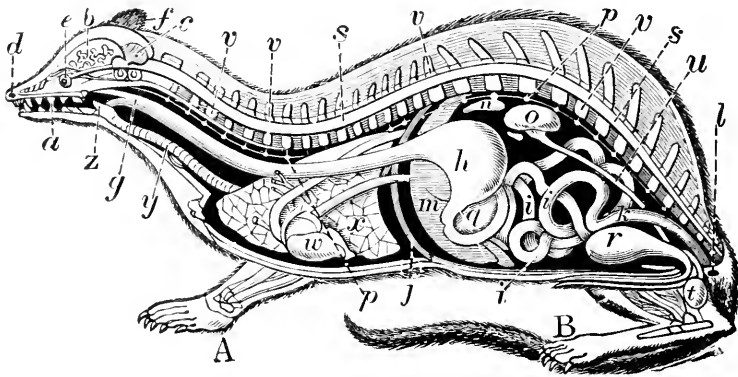


FIG. 7. — IDEAL SECTION OF A MAMMALIAN VERTEBRATE.

A, pectoral, or fore limb; B, pelvic, or hind limb; *a*, mouth; *b*, cerebrum; *c*, cerebellum; *d*, nose; *e*, eye; *f*, ear; *g*, esophagus; *h*, stomach; *i*, intestine; *j*, diaphragm, or midriff; *k*, rectum, or termination of intestine; *l*, anus; *m*, liver; *n*, spleen; *o*, kidney; *p*, sympathetic system of nerves; *q*, pancreas; *r*, urinary bladder; *s*, spinal cord; *u*, ureter; *v*, vertebral column; *w*, heart; *x*, lung; *y*, trachea, or windpipe; *z*, epiglottis.

with a secretion called gastric juice. Known as chyme, it passes into the smaller intestine (*i*), where it is brought into contact with various secretions, as pancreatic juice and bile. It is now known as chyle, and finally passes to the blood vessels. Food is literally fuel for the living machine, and the simple act of eating is, roughly speaking, a marvelous transformation of crude matter into the bone and sinew of animal life.

The heart of mammals (Fig. 8) is four-chambered, a feature easily seen if a section is made (Fig. 9). It is the

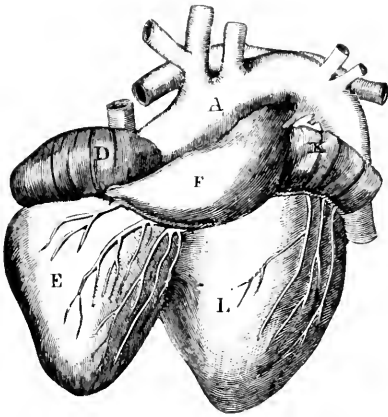


FIG. 8.—HEART OF THE DUGONG, A FOUR-CHAMBERED HEART, THE PARTS BEING MORE SEPARATED THAN IN THE HIGHER ANIMALS. E, right ventricle; L, left ventricle; D, right auricle; F, pulmonary artery; K, left auricle; A, aorta.

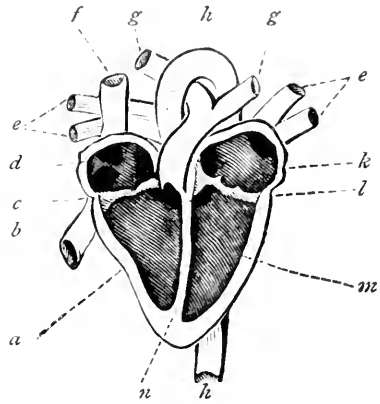


FIG. 9.—THEORETICAL SECTION OF THE HUMAN HEART.

*a*, right ventricle; *b*, inferior vena cava; *c*, tricuspid valve; *d*, right auricle; *e*, pulmonary veins; *f*, superior vena cava; *g*, pulmonary arteries; *h*, aorta; *h*, left auricle; *l*, mitral valve; *m*, left ventricle; *n*, septum.

pump which forces blood through the body to the lungs, where it is aërated.

The blood contains two kinds of corpuscles (Fig. 10), red and white. The red corpuscles differ so much in different animals that experts can readily distinguish animals by them. No more attractive sight under the microscope can be imagined than the web

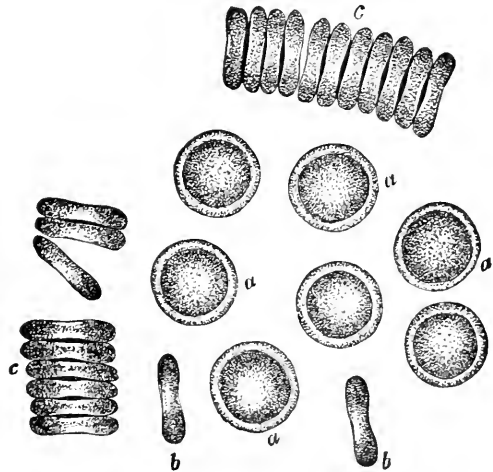


FIG. 10.—RED BLOOD CORPUSCLES OF MAN. *a*, shows circular contour; *b*, a biconcave section; *c*, a group in chains.

of a frog's foot (Fig. 11), where the corpuscles can be seen following one another through the veins in an endless procession.

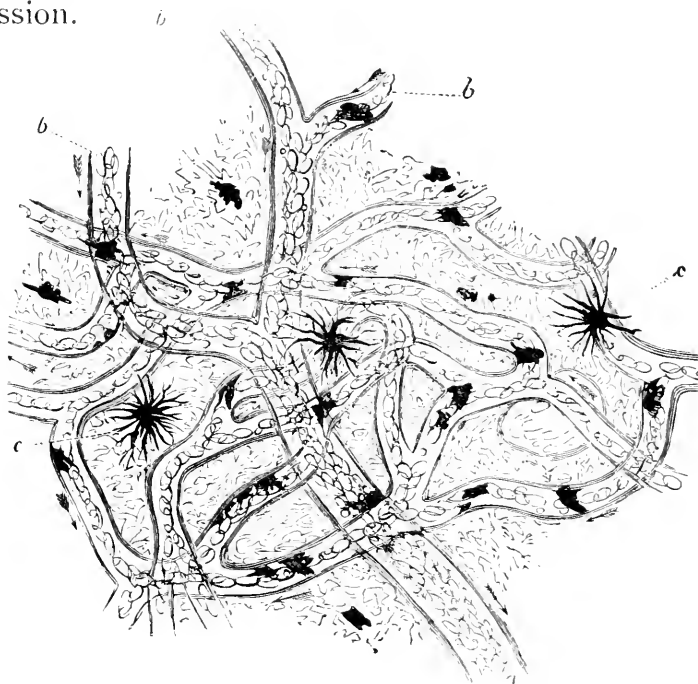


FIG. 11. — CAPILLARY CIRCULATION IN THE WEB OF A FROG'S FOOT,  $\times 100$ .  
*a, b*, small veins; *d*, capillaries in which the oval corpuscles are seen to follow one another in single series; *c*, pigment cells in the skin.

In the mammals and higher animals in general, the blood vessels are of two kinds, arteries and veins. The former take blood from the heart, while the latter conduct it back to that great reservoir. The veins have curious valves (Fig. 12).

The mammals breathe by means of lungs (Fig. 13), which are elastic, spongelike organs permeated with air cells. Air, by the breathing process, is taken in at the nostrils or mouth, and reaches the blood in the lungs, there aërating it.

The brain of mammals is larger than that of many



other animals. Extending from it is the long, protected cerebro-spinal cord, with its myriads of nerve branches. All the impulses arise in the brain, and what are equivalent to orders are sent along the nerves to the various organs, which obey the desire or impulse.

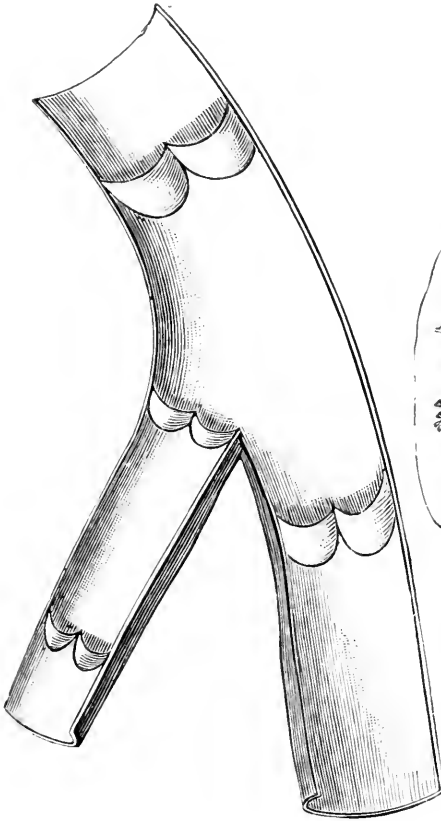


FIG. 12. — VENOUS VALVES.

They usually occur in pairs, as represented.

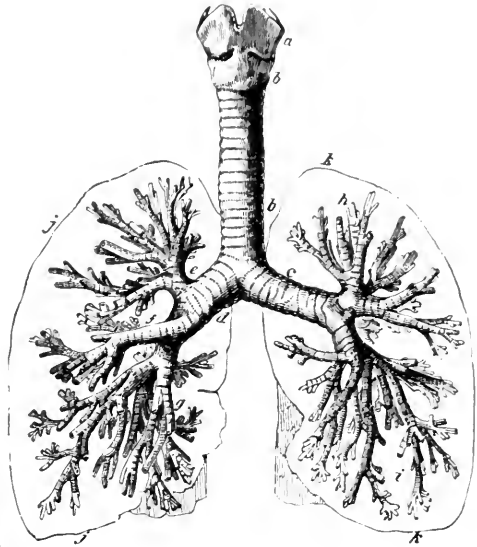


FIG. 13. — DISTRIBUTION OF AIR TUBES IN MAMMALIAN LUNGS.

*a*, larynx; *b*, trachea; *c*, *d*, left and right bronchial tubes; *e*, *f*, *g*, the ramifications. In man the subdivision continues until the ultimate tubes are one twenty-fifth of an inch in diameter. Each lobule represents in miniature the structure of the entire lung of a frog.

All the mammals, if we except the mole, have well-developed eyes, and all but the whale and some seals have external ears. Nearly all mammals are covered with hair, the whale being an exception. Some, as the armadillos, are protected by horny plates.

## II. ANCESTORS OF MAMMALS

In studying the history and habits of the mammals, or milk givers, it is interesting to look into the past and, where possible, glance at the ancestry, the origin, of this large and important group of animals which includes man. To do this we must turn to the geologist or paleontologist, who has made it a study, and we find that the mammals of the past, at least the land forms, were far more remarkable than at present.

The mammals appeared upon the scene, so far as we know, in what is known as the Tertiary time; the first being small marsupials, or pouched animals, whose bones have been found in the rocks of the new red sandstone.

In early days America presented a totally different appearance from what it does to-day; thus in the Eocene time the west section, as Wyoming, had a tropical climate, and strange animals wandered by the shores of a great tropical lake. To obtain an idea of the vast size and weird appearance of these animals, the reader should visit the Museum of Natural History, New York, or the one at New Haven, or the National Museum, where the skeletons of these strange ancestors of the mammals are to be seen. One group is known as the Dinocerata, terrible horned monsters calculated to strike terror to the human hunter had he lived at this time.

One of the most interesting is the *Tinoceros* (Fig. 14), which, so far as general appearance is concerned, resembled

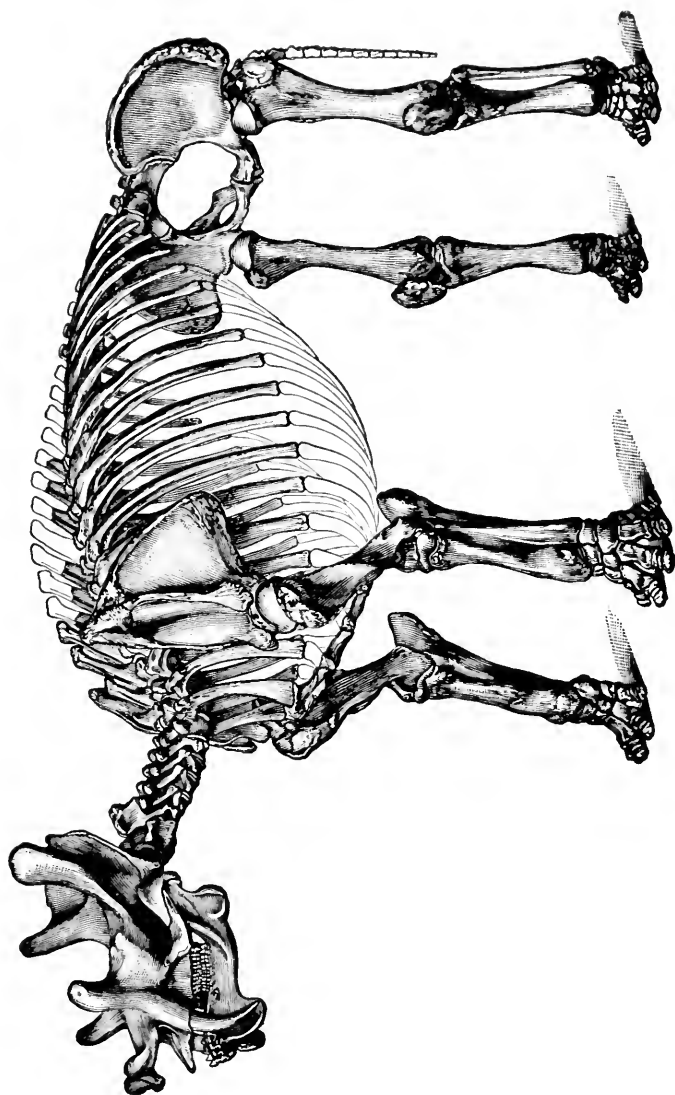


FIG. 14. — THE SKELETON OF THE TINOCEROS.

a combined rhinoceros and elephant. Its legs were long, its feet covered with thick pads, the eyes deeply set; and in the upper jaw it had two caninelike teeth, or tusks. This monster was twelve feet in length, with a body resembling that of an elephant; its head was like that of a rhinoceros with the saberlike tusks of a tiger. It had two large rhinoceroslike horns with two smaller ones below, while on top of the head rose a pair of tall prominences like the covered "horns" of a giraffe. About thirty or more forms of these strange creatures have been found, the late Professor Marsh of Yale University having made a special study of them, with results that can best be seen at the Yale Museum.

These wonderful creatures are known to have wandered along the tropical lakes of Wyoming, browsing amid rich and luxuriant herbage. What a contrast to-day! By some marvelous change this location is now far from tropical and is in part a desert. Some fearful catastrophe seems to have occurred, and what a few million years ago was a garden is to-day a desert, and what was once a vast inland lake is now on the crest of the continent, a jumble of broken strata tossed, bent, broken, a maze of buttes painted in fantastic colors, rising like ruined castles, a picture of sedimentary ruin.

All this marvelous series was deposited at the bottom of some lake, and in the soft mud the hard parts of the various animals that lived during that time have been preserved. By some marvelous cataclysm the old lake beds were tossed upward; they hardened in the suns of an eternity; then began their demolition by wind, rain, and snow. The deposit was cut by floods, rent in every way,

and the bed of the old lake exposed; to-day it is known as the Mauvaises Terres, or Bad Lands, through which explorers ride or walk, hunting for the bones of the giants which once lived in the old lakes.

No more fascinating hunt can be imagined than this. Here is found the head of some monster; a ravine has cut away the center portion, and on the opposite butte are found the legs. For years these skeletons and bones were found by herders, and used for various purposes; then when their value was appreciated, they were collected and sold to the great museums of the world. I well remember passing through similar "Bad Lands" between Salt Lake and the coast. Tall buttes rose in every direction, colored in all the splendid tints of the rainbow, telling of the wear and tear of centuries. They seemed to be the spires of churches, towers of castles.

In the Bad Lands are the monuments of a lost race. Professor Marsh discovered this marvelous Eocene collecting ground in 1870, and investigated it with a guard of troops as a protection against the Indians who, as might be expected, had no interest in science or sympathy with its disciples. In the lands east of the Rocky Mountains, in Nebraska, Dakota, and in Colorado, he discovered many strange mammalian remains. One of the largest was the Brontops (Fig. 15), which lived on the borders of an old lake in the Miocene time. It was, in effect, an American rhinoceros, twelve feet long, eight feet high, with a peculiar head calling to mind the rhinoceros. The head was three feet long and twenty inches between the tips of the two enormous blunt tusks that stood side by side. In all probability this uncanny monster had a long flexible

trunk like an elephant, and must have presented a strange appearance as it wandered along shore.

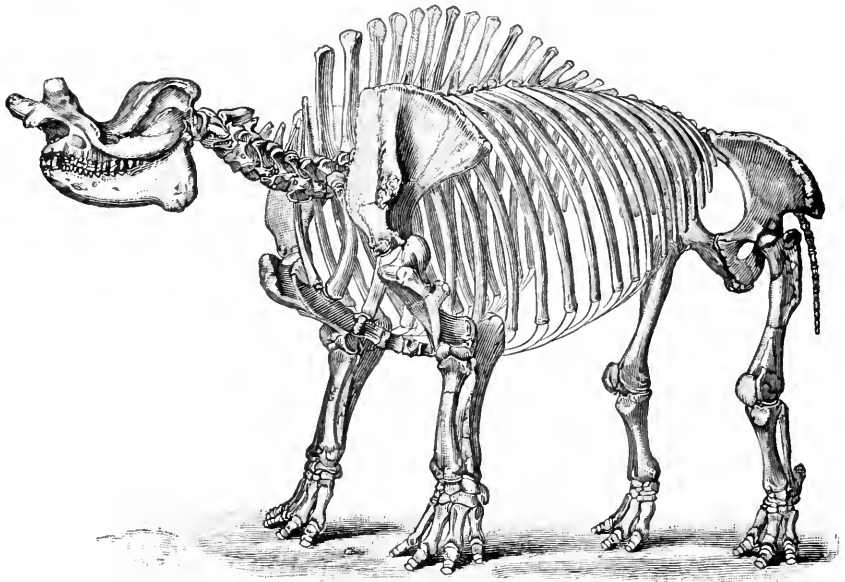


FIG. 15.—SKELETON OF BRONTOPS.

In South America to-day is found the sloth, one of the most remarkable of all animals; a hairy, moplike creature which passes its life clinging to the limbs of trees. This sloth had a remarkable progenitor, a giant in every sense, known as the *Megatherium*, skeletons or casts of which may be seen in many American museums.

In appearance the animal resembles the effigy of a kangaroo standing on its hind legs, doubtless a favorite position, which enabled it to reach the tops of trees and tear them down. Its hind legs were short and of colossal dimensions; its fore legs, long; its tail, which aided in its support, was also long and powerful. The length of this monster was eighteen feet, and its general appear-

ance very much like that of the ordinary sloth of to-day. What the weight of such a monster could have been is a question, but that it weighed many tons can readily be believed. Another of these giant sloths, the *Mylodon*, not less interesting, was eleven feet long.

These animals roamed the forests of South America in the Pleistocene period, when North America was covered in part by an ice sheet — the so-called glacial period, during which the mammoth lived. In studying these giants, and the times in which they lived, a fascinating field is opened up, and the question, why such huge animals should have been entirely wiped out of existence,

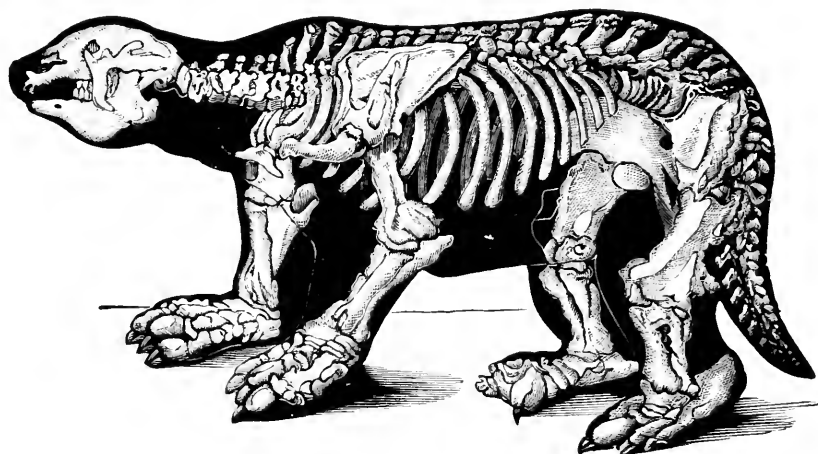


FIG. 16. — THE MEGATHERIUM.

arises. It is believed that the huge *Megatherium* (Fig. 16) was the victim of droughts, which from time to time sweep over South America, killing the cattle. These sometimes last for three years, and then the great rivers are mere streams running between vast walls of soft mud. To reach the water, animals of all kinds make their way into

this and are caught and entombed. Untold ages afterward the hardened skeletons may be washed out of the disintegrating rock, long after the river has disappeared.

Crossing to the Old World, we shall find in India a remarkable animal called the *Sivatherium giganteum*, a seeming connecting link between the giraffe and the antelope, resembling somewhat a giant moose. It had a short proboscis, the teeth of a giraffe, and four horns instead of two, which resembled those of an antelope. Its jaw was enormous, being twice the size of that of a bison. What is known as the Irish Elk is one of the splendid ancestors of the present stag or deer—an animal that, in all probability, was hunted by early man. The skeleton of one of these stags can be seen in the American Museum of Natural History, New York, and presents a commanding, indeed noble, appearance. To the summit of the royal antlers it is ten feet four inches; the span of the antlers is eight feet—twice that of the living moose; the weight of head and antlers is from seventy-six to ninety pounds.

The remains of this fine deer were discovered in caves, and in shell marls, and under peat beds. In one ancient Irish lake about one hundred heads and six complete skeletons have been found, showing that the big deer swam or walked in, and doubtless became bogged; or the heads may have been cut off and thrown away by the early hunters, and the bodies cut up and carried off.

One of the most interesting of the early mammals was the woolly rhinoceros, contemporaneous with the mammoth; it was a giant covered with wool, and provided with two enormous horns. Among the elephantine animals of



former days the mastodons were particularly interesting, being giant elephants with from one to four tusks. *Mastodon turicensis*, of the Pliocene time, had two tusks in the upper jaw, straight, turning toward each other at the points. In *M. ohioensis* the tusks tipped up gradually in a graceful curve; and in the lower jaw was a single tusk, so that the animal was a three-tusker. In *M. longirostris* there were, besides two long upper tusks, two short sharp ones in the lower jaw — a formidable defense. Four species of these huge creatures formerly roamed America, besides an elephant proper, and the mammoth. Five species have been found in India, and two or three in England. With these large elephants were pygmies, animals not larger than the common sheep.

Larger than the elephants was the Dinotherium (Fig. 17), a huge elephantine animal with a proboscis and two large tusks, calling to mind those of the walrus, inasmuch as they turned down and in toward the body, and doubtless could be used by the animal in pulling down limbs or even hauling itself up a steep bank from the water, in which it is supposed to have been as much at home as the hippopotamus.

Besides these strange forms there were countless others, large and small, that must have roamed the world in this age — the forerunners of the mammals of to-day. Herds of horses (Hipparion) galloped over the plains; the fierce,

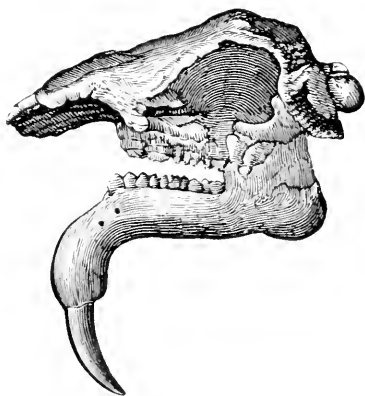


FIG. 17. — SKULL OF THE  
DINOTHERIUM.

saber-toothed tiger lay in wait for its prey. Here was the *Helladotherium*, larger than a giraffe, but with shorter legs; the thick-skinned *Chalicotherium*; the *Erymanthian*, wild boar; while giant lions and panthers stalked the smaller game.

### III. THE EGG-LAYING MAMMALS

The young of most mammals are born alive, but a few years ago it was discovered that the strange animals

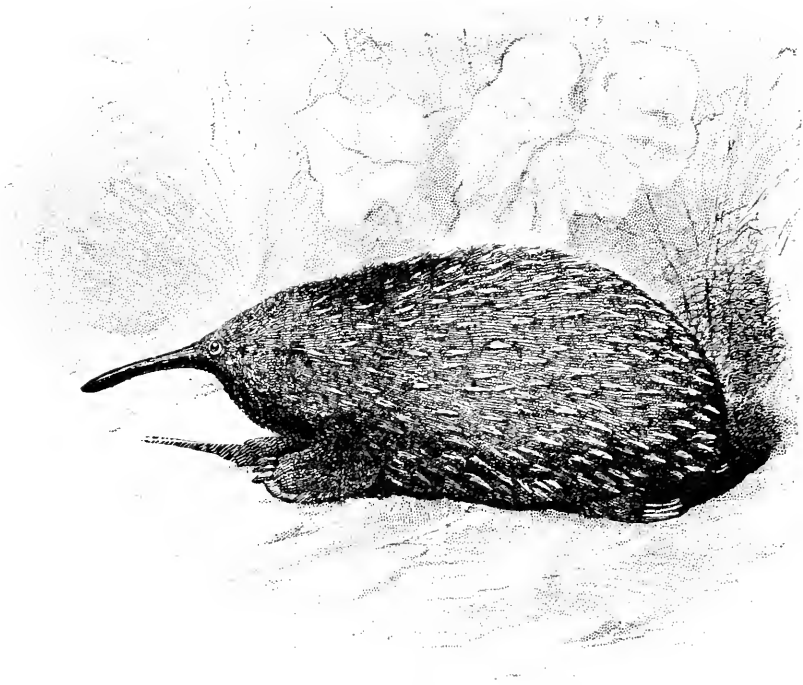


FIG. 18.— EGG-LAYING ECHIDNA. (A MONOTREME.)

known as monotremes (Fig. 18) laid eggs, the discovery creating a widespread sensation in the scientific world.

The ornithorhynchus (Fig. 19) is a remarkable creature, seemingly being made up of a number of entirely different animals. When the first specimen was sent to England, the skin was very carefully examined, as it was

believed to be a hoax. The animal has a ducklike bill. The male has a spur on the hind foot, while the fore foot is webbed, suggesting the duck. The duck mole, as it is also called, also lays an egg—but here the resemblance



FIG. 19.—THE DUCK MOLE THAT LAYS EGGS.

to a bird ceases. The animal is covered with soft hair, and nourishes its young. The duck mole is peculiar to Australia and the adjacent island of Tasmania. It frequents the streams of those countries, having very much the same habits as the muskrat of America. It is perfectly at home in the water, diving to the muddy bottom and using its

bill like that of a duck to aid it in capturing worms and various insects which serve as food.

The nest is a long tunnel in a bank (Fig. 20), calling to mind that of the swallows, though the burrow of the

duck mole is entered from the water as well as above it. It rises until it is sometimes forty feet from the water, and then is enlarged, forming a commodious room lined with soft grasses. The hunter watching this quaint little creature swimming or



FIG. 20. — NEST OF THE DUCK MOLE.

coming to the surface might well mistake it for a duck, and even when compared with some of these animals it shows a remarkable resemblance. If it becomes suspicious when on the shore, it will rise upon its hind legs, presenting a singular appearance. It is very rarely seen in the broad daylight, and so well is this understood that natives rarely hunt for the animal in the daytime. The

approved method is to walk along the bank, probing the soft earth with an iron bar; and so skillful are some of the natives that they can tell at once when this rod passes into the nest of a duck mole.

The duck mole deposits two small, oblong eggs. Each of these is inclosed in a white skin, strong and flexible, and is three fourths of an inch in length and half an inch in width. Although the duck mole is very timid, it makes an interesting pet and is readily trained. An Australian naturalist kept several in confinement. The little creatures proved most amusing companions, climbing upon the chairs and even upon his shoulders and displaying a very curious disposition.

Almost as interesting as the duck mole is the echidna, a little monotreme called also the spiny ant-eater. It has a ducklike bill, but is covered with hard, sharp spines like a hedgehog. The tongue is long like that of an ant-eater. The claws are powerful and formed for digging into ant-hills, where their food is found. The skull is very simple. They have no teeth, the margins of the jaws or bills being sheathed with horn. The echidna is a land animal, the claws not being webbed. The Australian species measures about eighteen inches in length and is entirely nocturnal, prowling abroad at night, and concealing itself by day in its long tunnel in which the young are reared. A species is found in Tasmania and two in New Guinea. The most remarkable feature of the animal is that it lays an egg, which is placed in a ventral pouch. The nest is found at the end of a long tunnel.

#### IV. VALUE OF MAMMALS TO MAN

In the study of nature it is necessary in this age of progress to have in mind the practical value of animals and their economic relations to mankind. Every animal has some use, fills some niche in the economy of nature.

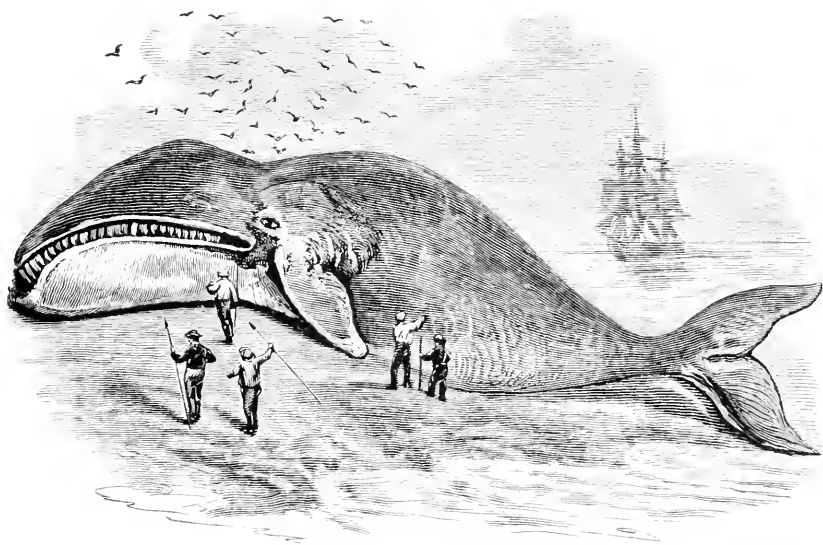


FIG. 21. — THE WHALEBONE WHALE.

All the large mammals are of value. The great whalebone whales have been followed with such success that they may be said to be on the border land of extinction, and it will be remarkable if the present century does not see the last of some of them. They are valued for their oil held in the blubber or fat, and for the whalebone, the peculiar fringes of the mouth which act as strainers. The

valued ambergris is a product of the whale, and even its great bones are saved ; indeed, there is a fishery in Norway, or in some of the adjacent islands, where the entire whale is brought in and every part of it utilized and converted into a valuable product.

The seal family is exceedingly valuable, and this country has been on the verge of serious trouble many times on account of the depredations of illegal sealers on American fur-seal preserves. Exact and careful laws are enacted for the protection of the fishery ; but despite this, the animals are butchered by fishermen who follow them to sea and shoot them. The government protects the catch

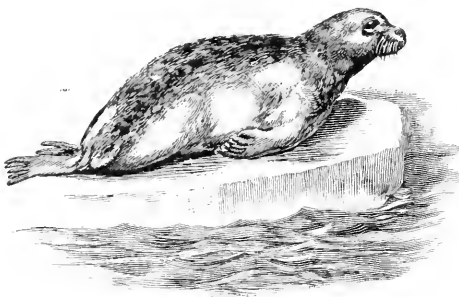


FIG. 22. — THE HARBOR SEAL.

ashore and is doing what it can to preserve the animals ; but the end of the century will doubtless see the last of the seals, which afford the finest sealskins for personal wear. The return from this source is very large and if the entire

proceeds per annum of the fur trade could be estimated, it would approximate a vast sum, showing that fur has an important bearing as a commercial factor.

Even the sea lion of the Pacific coast has a value as an exhibit in zoölogical gardens and shows of various kinds, and at Santa Barbara a number of men skilled in throwing the riata capture them on the off-shore islands for market.

In the South Pacific, on Kerguelen, Heard, and other islands, a war of extermination is being carried on against



the sea elephant, the largest of the tribe, an animal often twenty-five feet in length. The men outfit at the Cape of Good Hope, go to the islands under contract for one or two years, and are left in the most desolate place in the world. At one island the beach is so situated that the men kill the animals and haul them off through the surf. The climate here is cold and windy, yet men inure themselves to it, and the aggregate sum derived from the fishery is

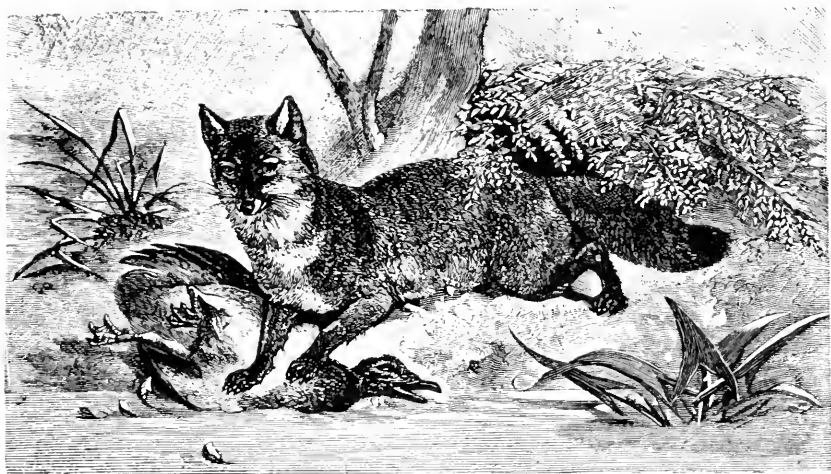


FIG. 23. — THE FOX.

very large, the oil being the most valuable article. This means the extinction of the animal in a few years.

Almost as large is the walrus, also killed for its oil, although the long beautiful tusks are the most valuable article from this source, and many hundred pounds are taken yearly.

The mink, sable, ermine, fox, and many small animals of the north are valuable, the Russian sable and ermine especially being valued. As fashions change, many furs are used and valued whose nature is unsuspected. Thus

the skunk has a beautiful fur and is bred for the purpose ; but as it would not sell under that name it is called by some other title. Rabbit skins are sold by tens of thousands, also those of goats, cat, dog, and rat — in fact, there is hardly an animal that can be mentioned that is not of value. Over a million catskins are sold yearly in America, dyed and made into cheap furs. Rat skins are used in the manufacture of gloves. Mole skins, which are very beautiful, are used for the finest furs, while monkey skins also have a value. The rug business alone in lion, tiger, cat, ocelot, and other skins represents several million dollars in America, and the government derives a large revenue from those imported, while we send elk horns and others to Europe. The best-known skin a few years ago was that of the bison, and almost every farmer and owner of a horse had a "buffalo robe." In the early days these could be bought for a few dollars, but to-day they are preserved by those who have them as legacies to hand down, and are very valuable.

A curious business was seen on the plains after the destruction of the bison, in the collection of its bones. Hundreds of tons of these skeletons were collected, piled up in enormous heaps at stations, and hauled away by the train load to be ground up as a fertilizer. Thus the bones of the splendid bison were used to lend vigor to roses and other flowers, and so turned into gold.

In former years there were few if any restrictions on game or its taking off, but now the various state governments realize the value of game to them and they are carefully protected and placed under certain limitations. The State of Maine affords an excellent illustration of the

value of game, for the State game commissioners testified several years ago that the game — deer, moose, and others — was worth five million dollars to the State. In other words, that amount of money was expended by the sportsmen every year, going to hotels, railroad guides, gun and powder dealers, and others.

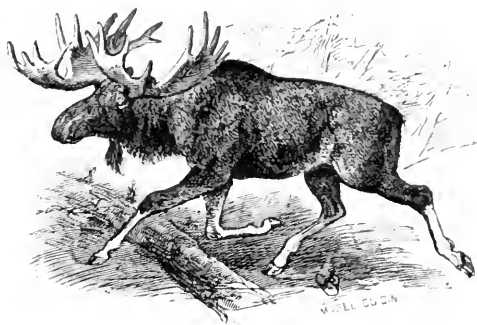


FIG. 24. — THE MOOSE.

Statistics tell us the enormous sum, far up in the millions, represented by cattle alone in America. Chicago is the center of this vast trade, and great cattle ranges are found all over the West where cattle are raised for the market and sent to Chicago, where

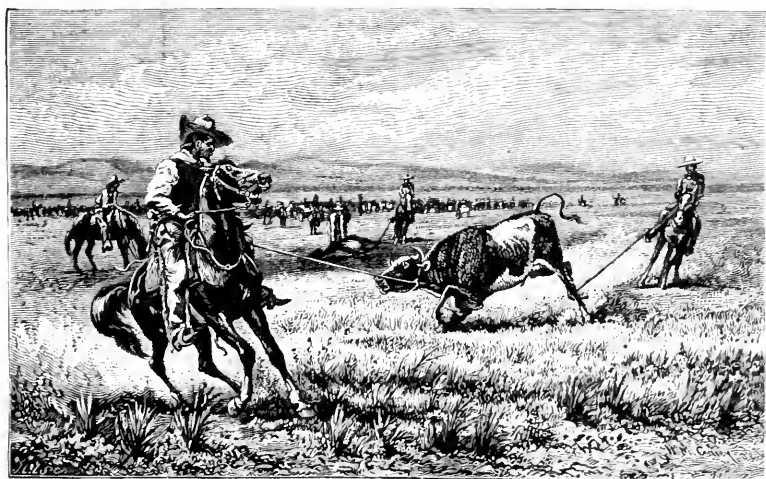


FIG. 25. — ROPING CATTLE.

the business of preparing them has been made a science. Animals are reduced to their component parts in a remark-

ably short space of time. No part is wasted ; every item is of some value, from the blood used in dye, to the hairs used for mixing with plaster.

The great packing houses sell their products to the retailer, who in turn charges a larger sum, and the beeves of a year, which often realize millions in the hands of

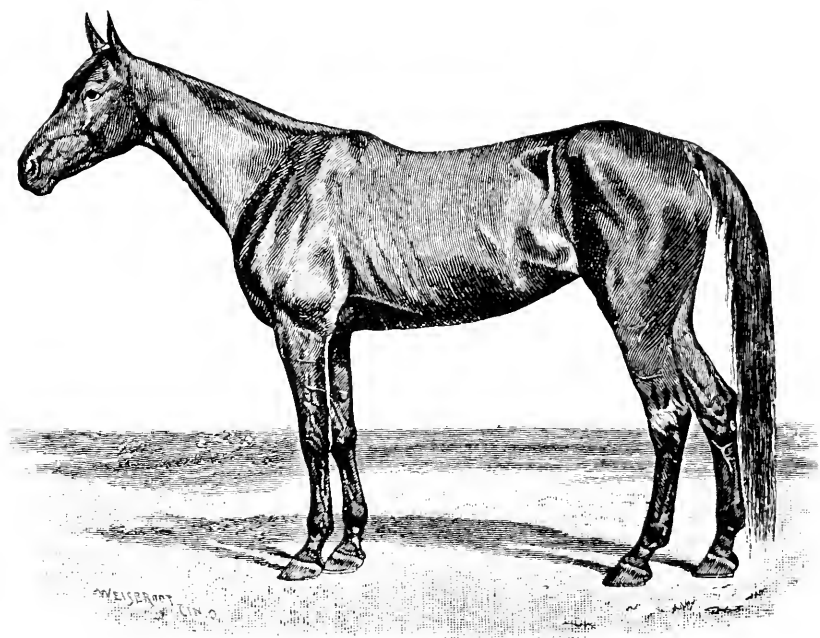


FIG. 26. — THE AMERICAN TROTTER.

raisers, produce many more in the hands of the retailer. Fortunes have been made in building ice cars to carry and transport meat, and millions are invested in the products, prepared meats, ham, dried beef, and various other articles, which require a large force of men, tens of thousands, all over the world to handle. Few mammals are more valuable to man than the ordinary cow.

The horse represents a vast outlay and income. Large

stock farms for horses are found all over the world, and thousands, yes millions, of dollars are spent in experimenting with this animal to produce a better breed, or to reduce trotting, running, or pacing records a few seconds, and great fortunes are paid for the best and fastest horses. In France, the horse is eaten; and in all civilized nations it is used as a beast of burden.

Africa is famed for its large game among mammals, of which the elephant is the largest. In former years vast

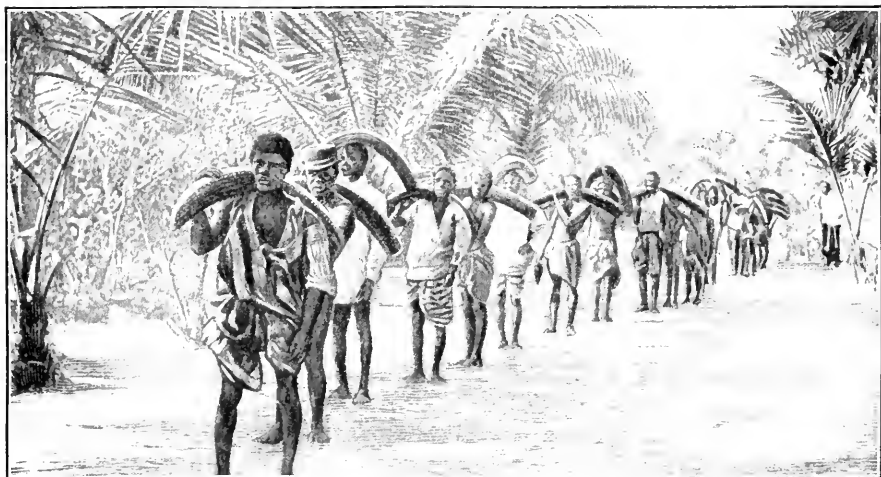


FIG. 27. — NATIVES CARRYING ELEPHANT TUSKS.

sums have been made by the dealers in tusks, and elephants have been slaughtered very much as was the buffalo, and had not the various governments interfered they would have been wiped out of existence. The hide of the elephant is used for leather, its feet are used as seats, and the tusks are employed in the manufacture of billiard balls and other objects, while the flesh is valued by the natives. For every tusk that is brought to the coast, it is said several slaves lose their lives.

A few years ago all the tusks were brought out by slaves, the unfortunates bearing them on their heads, and often falling dead under the strain and intense heat. To-day the government charges a license to all hunters, and the elephant brings the country a large revenue.

## V. THE POUCHED ANIMALS

In passing the entire animal kingdom in review we note many animals which have pouches, as the echinus, the sea-horse, several toads, some of the penguins, the spiny anteater, and others. All these, however, differ from the large and singular group of animals called marsupials, which have a very perfect pouch on the lower or ventral side, where the immature young are placed and kept and nursed until they are large enough to care for themselves.

The kangaroo (Fig. 28) is the highest type of this form, the pouch being so large that the young seek refuge in it long after they can care for themselves. It is an amusing sight to see them when alarmed plunge into this receptacle, turning quickly and thrusting out their little heads to see what the disturbance is about.

The kangaroos are among the most interesting of all animals. Some are six feet in height, and all have a remarkable development of the hind legs by which they can leap enormous distances, literally flinging themselves through the air. A kangaroo has been known to leap over a horse and rider, and the hare kangaroo, which is only twenty inches in length, has been seen to leap over a man's head. The hind legs of the large kangaroos (Fig. 29) are their weapons of defense. These have three toes, the middle one being very long and armed with a sharp daggerlike claw with which the animals cut and wound their enemies. Even men have been killed by them.

The spectacle of a band of large kangaroos fleeing before a pack of hounds is very exciting. The animals are tall and naturally stand on the hind legs, the fore limbs being very short, the large and powerful tail acting

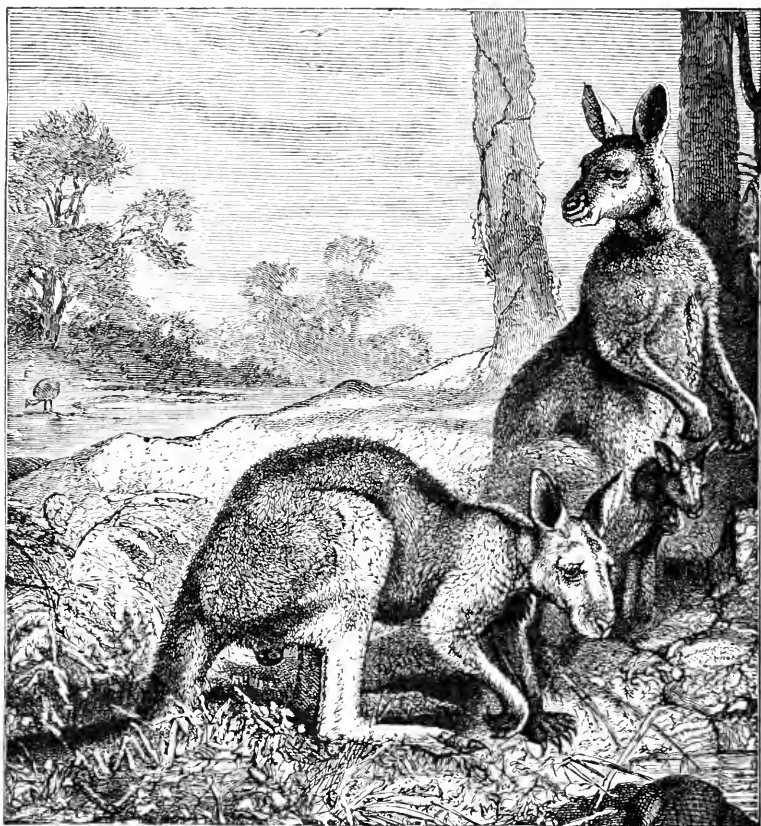


FIG. 28. — KANGAROOS.

as a support. When they jump, their tails possibly aid them. A large kangaroo can clear from twenty to twenty-five feet at a leap, easily distancing anything but a fast horse. When attacked it makes a hard, even desperate, fight for its life.

In general appearance the animal is attractive. When



standing upright it holds its short paws in a drooping position, its ears erect, its mild and beautiful eyes glancing about. When feeding, it drops on all fours and moves along with a half leap.

There are many species of kangaroos in Australia. Some are such pests that the planters combine against them at times and have "kangaroo drives." At such times the men for miles about come on horseback with their dogs and, forming a long line across the country, gradually drive the stricken animals to their death.

The young of the kangaroo, generally two, are very helpless when born. They are at once placed in the pouch, where they are carried for a long time. The mother is often seen leaping with the head of the big baby kangaroo looking out of its nest. In the sea horses it is the male that has the pouch, but in the kangaroo it is the mother. The pouch of the kangaroo is supported by two bones which spring from the front of the pelvis.

All the kangaroos are confined to Australia, living on the great grassy plains or prairies of the country. The tree kangaroo, as its name indicates, affects trees, eating the leaves and branches, while the rock kangaroo frequents sterile locations.

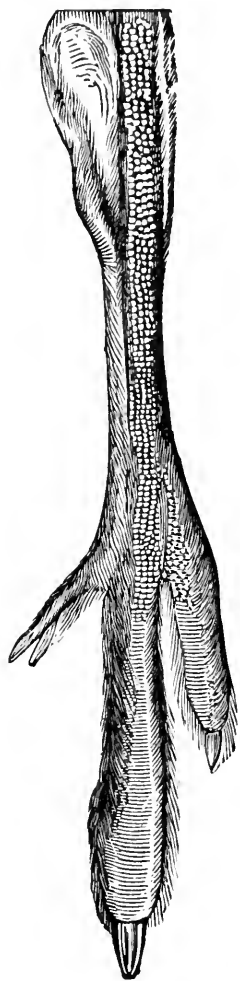


FIG. 29.—HIND LEG  
AND CLAWS OF A  
KANGAROO.

The bandicoots are singular little creatures bearing some resemblance to kangaroos. They are found in Australia and Tasmania. Some, as the choeropus, resemble pygmy deer and have remarkable feet, all the toes, except the fore ones, being very small; the animal walking upon two toes of each fore foot. This strange creature burrows in the ground. It is a timid little creature, presenting a strong contrast to the Tasmanian wolf (Fig. 30, 3), a handsome carnivorous animal with a long tail, wolflike head, and marked stripes across the back. The latter is a night lover, and when exposed to daylight a third eyelid can be seen working backward and forward over the sensitive eye. It lives in inaccessible places and is rarely captured.

Of somewhat similar habit is the Tasmanian devil (Fig. 30, 2), an animal confined to Australia and somewhat resembling the badger, though more ugly and bearlike. There are few animals that are not susceptible to taming, but the Tasmanian devil is one exception. When in confinement it retires into the farthest corner and snarls at all comers, utterly repudiating any advances that may be made. When Hobart Town was first settled, the animals were very common. They preyed upon the poultry of the settlers, and were killed and eaten by the convicts. They are nocturnal, and when confined occupy their time in fighting.

The wombat (Fig. 30, 1) is about two feet in length, with a rudimentary tail, a short neck, and a very large head for so small an animal. Its legs are short, giving it a singular, waddling walk. The wombat lives in burrows, which it digs with its powerful claws. It feeds upon roots, having

sharp incisor teeth. A remarkable feature of the animal is its persistency. When traveling at night it has been known, according to Brehm, to roll into a stream, but even the sudden plunge does not interfere with its journey, which is continued without deviation. It differs from the Tasmanian wolf and others in being very good-natured in confinement, though doubtless well able to defend itself when attacked.

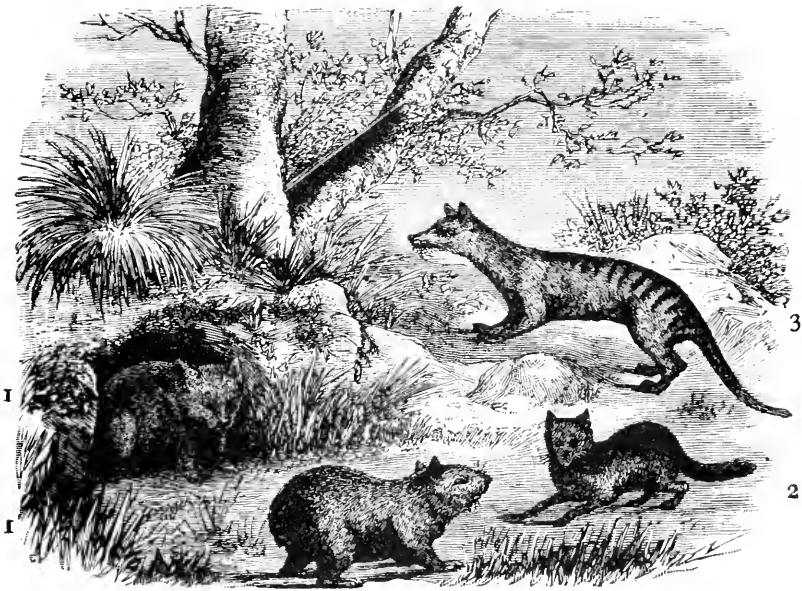


FIG. 30. — 1, WOMBAT; 2, TASMANIAN DEVIL; 3, TASMANIAN WOLF.

A very interesting marsupial is the koala, or native bear, a curious little creature with long woolly hair and prominent ears. It is found in the forests, often carrying its young upon its back, and is there hunted. The natives, who often follow it to the tops of the tallest trees, are as fond of its flesh as the negro is of opossum.

Among the most beautiful of the marsupials are the flying phalangers, which we call the flying squirrels.

These have a soft membrane between the fore and hind pair of legs, which spreads out as they leap and serves as a parachute. Some are as large as cats, and all are mild-eyed, attractive little creatures. The young are carried in a pouch, and later are seen upon the back of the mother.

The only marsupial found out of Australia is the opossum. It is about twenty inches in length and is covered with white hair tipped with brown, giving it a dirty appearance. The tail, which is long and slender, is really a fifth limb, being prehensile, or having the faculty of winding about a limb and swinging from it with perfect ease. "Playing 'possum" is a familiar term and applies to a trick the animal has of feigning death, often remaining motionless though pushed and even tortured.

The pouch is well developed, the ears are naked like those of a bat, the tail is long and scaly like that of a rat. To appreciate its resemblance to a fifth hand one must see an old opossum walking along, its tail thrown over its back (Fig. 31), and five or six young ones clinging to it, each little tail wound about the large one. The young when born are perfectly helpless and about half an inch in length. They sometimes number as many as thirteen. They are placed in the pouch, each one attaching itself to the mammary gland and retaining its position for several weeks. For the first two weeks the pouch is kept closed. In six weeks the young opossums have attained the size of mice, but they do not leave the pouch for two months.

The opossum is a night animal, sleeping during the day. It forms its nest in a tree trunk, lining the hollow with grasses.

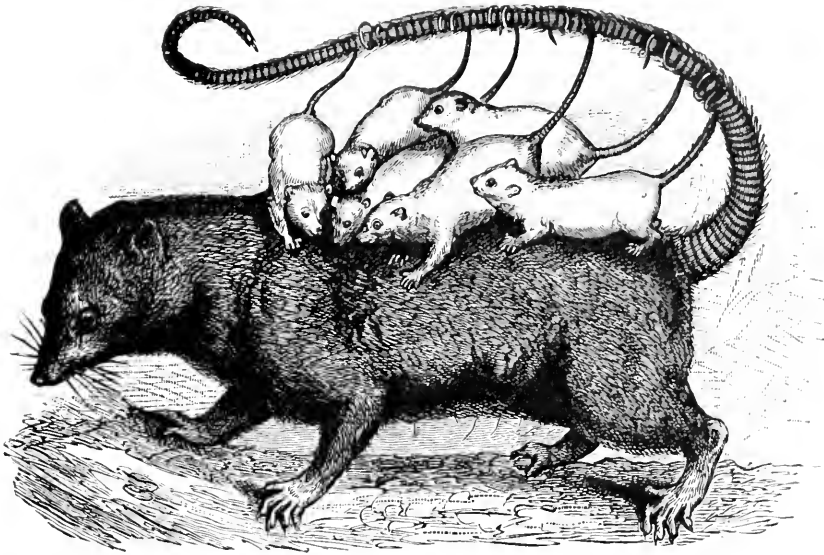


FIG. 31. — OPOSSUM AND YOUNG.

Opossums have a wide range, even to California. In Brazil and other provinces of South America there are several species, one of which is as large as a squirrel. Some species have no pouches or only rudimentary ones. One from Surinam resembles a brown rat. Another form is not larger than a mouse and preys upon birds. Still another opossum, found in Peru, is a fruit eater. In Guiana and Brazil is found one of the most interesting of the tribe, the water opossum, with webbed hind feet and a perfect pouch. The yapoch, as it is called, resembles the otter in its habits, eating small animals.

It is an interesting fact that almost all the marsupials are natives of Australia, and that all the native mammals of that isolated continent are marsupials, a rule that held far back in the Quaternary times, when the pouch bearers were giants. The diprotodon was a kangaroo as large as a rhinoceros, its skull alone being three feet in length.

## VI. SOME TOOTHLESS MAMMALS

Certain curious animals, as sloths, ant-eaters, armadillos, and others, have no incisor teeth, or are entirely toothless. For this reason they are called edentates. They are among the most remarkable and singular of all animals, some being clothed in scales instead of hair, and others so completely covered by the latter that they resemble brush or mounds of vegetation.

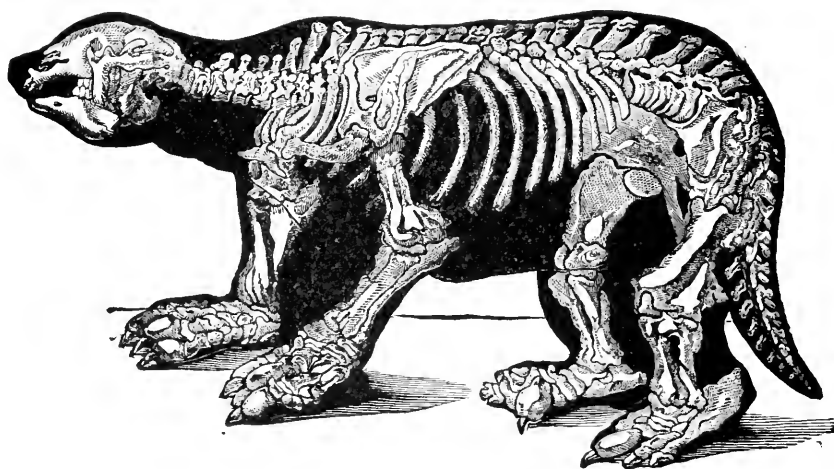


FIG. 32. — THE MEGATHERIUM.

In South America geologists have discovered the remains of gigantic animals of this group, so huge, in fact, that it is difficult to understand how they could move. In excavating in the side of a river bed some workmen uncovered the skeleton of a megatherium (Fig. 32), which when mounted was eighteen feet high.

Another form, the megalonyx, was as large as a rhinoceros. These giants were sloths, and they reared their ponderous forms against the trees and tore them down, stripping them of verdure for food. They were the ancestral forms of the strange sloths found in South America to-day (Fig. 33).

These sloths are peculiarly adapted to life in trees, their long claws enabling them to cling to the limbs and hang pendent. When on the ground they are very helpless and at the mercy of any



FIG. 33.—THE SLOTH.

enemy. Their hind limbs dragging upon the ground, their movements are very slow. But once in a tree they can swing from limb to limb with great cleverness and speed, and so closely do they resemble clumps of moss that it is difficult to distinguish them. The body is covered with long gray and black hair. The head is small and blunt. Some are two-toed, while others have three toes.

Sloths are rarely seen out of the trees in which they feed. They even sleep at night clinging to the branches by their powerful claws, recalling the bats. Sloth hunters

are often deceived by the remarkable protective coloring of these animals. This is peculiarly true in the case of one, bradypus, as the hair naturally has a grayish tone that compares admirably with the bark of trees. Still more remarkable, the long, coarse hair becomes covered with a minute plant, known as *Chlorococcus*, which changes it to green, and the clinging animal has the appearance of leaves or moss, and easily escapes observation. Even trained observers have been known to mistake the sloth for a clump of feathery mistletoe.

The sloths seldom come to the ground unless forced to do so. A Tobasco farmer informed Dr. Oswald that he had kept a family of them under observation for eleven years and had never seen one descend from its leafy perch. Many rarely left the bough which they affected. Seemingly helpless as are the sloths, they have been known to throw themselves upon their backs and seize a dog, literally tearing it in pieces. Ordinarily, however, no animal is so utterly indifferent to the events occurring near it. It is almost impossible to annoy one, the animal being a type of all that is patient and negative, resembling an automaton more than anything else. At times they utter petulant grunts, and in the tropical forest where they are found sometimes a strange, mournful cry is heard, startling in its intensity.

The ant-eaters are among the strange animals from South America that are utterly devoid of teeth. They are covered with enormous masses of hair, and provided with a brushlike tail, and a very long tongue for sweeping up ants. The first one I saw could easily have been mistaken for a heap of brush, as it held its enormous tail (Fig. 34)



over its back, covering and concealing its young, which were standing on it. The huge tail is an umbrella as well, and must afford its owner no little protection from the sun.

No stranger animal can be imagined, and with its long head and small eyes, it excites the liveliest curiosity. It is large and powerful, and lives almost entirely upon the white ants, tearing down their nests with its strong claws and licking up the enraged swarms with its long tongue. In walking, the animal is discommoded by its claws and forced to step on the side of its feet. Al-



FIG. 34.—GIANT ANT-EATER.

though slow in its movements, it is an adversary not to be trifled with. Natives have been killed by a downward blow of its daggerlike claws. The specimen that I saw was perfectly docile. It licked my hand and rubbed its curious bill-like head against my arm like a cat.

The little ant-eater is almost as much of a tree climber as the sloths and is rarely found elsewhere than among the branches of some favorite tree.

Incased in perfect armor, the armadillos represent a family having a very ancient ancestry. In the deposits

of South America remains have been found which show that the armadillos of old were giants. One, the glyptodon

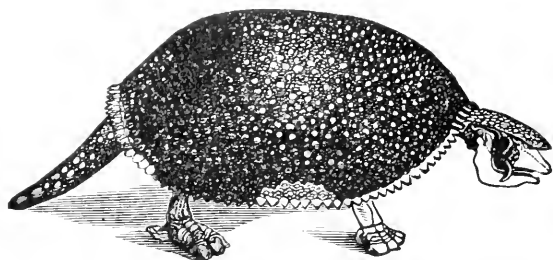


FIG. 35.—THE FOSSIL GLYPTODON.

(Fig. 35), resembled a huge turtle and was eight feet long. The finest specimen of its shell known was found by the side of a native hut where

the children were using it as a playhouse. Near the Plata the bones of an armadillo have been found as large as those of a rhinoceros.

The armadillo (Fig. 36) is a harmless animal. One which I had an opportunity to observe was an interesting

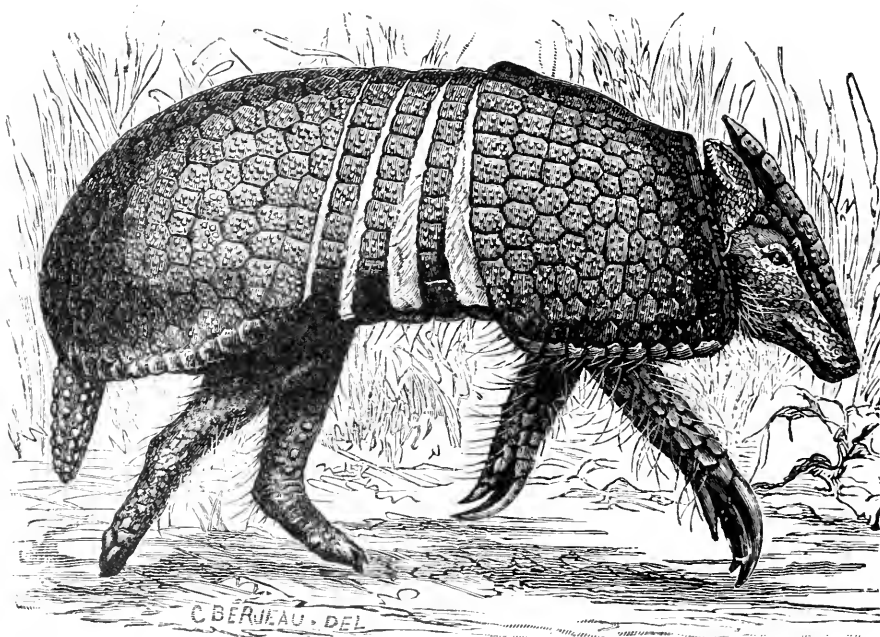


FIG. 36.—ARMADILLO.

pet, continually running about the room, and not resisting when picked up. Stranger than all else, it paid not the slightest attention to its young. When I took them away, it appeared not to notice the loss, and when they were returned, no demonstration was made. This peculiarity was so marked that I was convinced that the animal had little affection for its young.

The little armadillos were interesting creatures, their armor being soft like rubber. They were very active and playful, and it required several hours to photograph the group, as they were continually running about.

The armor on the adults is arranged in three different regions. One shield protects the head, another the shoulders, still another the back of the body, while between them are bands, which, while they work freely, are protective. The tail and feet are also protected.

The three-banded armadillo has a very clumsy walk. When alarmed, it immediately drops to the ground and rolls itself in a ball (Fig. 37), almost impervious to any

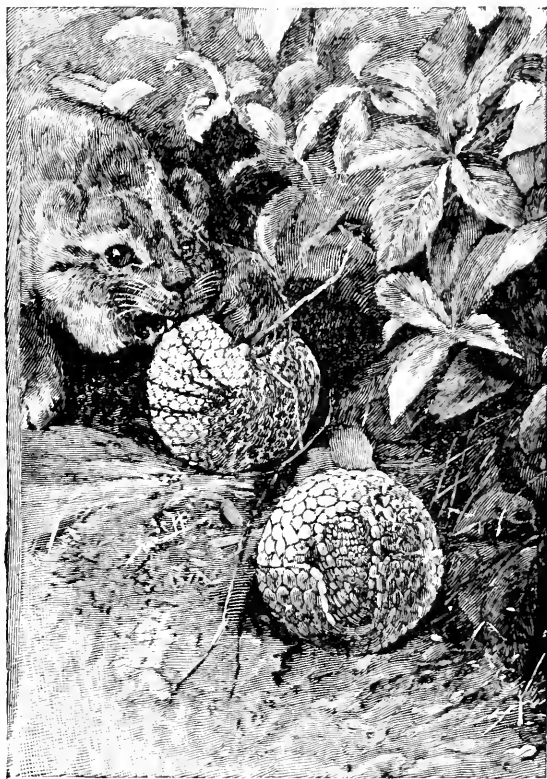


FIG. 37. — ARMADILLOS ROLLED UP TO ESCAPE THE PUMA.

animal except the great cats. An armadillo has been seen to roll itself up suddenly on the slope of a hill and then go bounding down like a cannon ball.

One of the armadillos, the peba, is found in Texas. It is about thirty inches in length, the shell having eight or nine bands.

All these animals have an unpleasant, musky odor, extremely penetrating and disagreeable. They dig burrows five or six feet in length and spend most of the time in them. The largest of these animals is the giant armadillo, which attains a length of five feet. It is a powerful creature, and has a habit of burrowing into graves. A common musical instrument in South America is made of the hardened armor of one form. The Boto-cudos, an Indian tribe in South America, famous for cutting and mutilating their faces, use the hard tail of a species as a trumpet.

The pichiciago is a remarkable allied form, bearing its shell upon its back, and appearing as though cut off abruptly. The lower part of the body is covered with hair. The animal passes much of the time underground, being very molelike in its habits.

The pangolins (Fig. 38) are still other allied forms, resembling lizards in form or shape. They are mammals covered with overlapping scales which constitute a perfect armor. They are found in tropical Africa and South America, and, despite their somewhat ferocious appearance, are harmless. They live upon ants, which they secure by digging into ant-hills and thrusting the long tongue into the hole and withdrawing it covered with ants. One of the African species is five feet in length. When

attacked it coils up, thus throwing out the scales which point in every direction, like blunt spines.

In the island of Ceylon there is a pangolin that is often used as a pet. One kept by Sir Emerson Tennant wandered about the house like a cat, ridding it of ants. When it desired to attract his attention, it would climb into his lap and twist its prehensile tail about his legs.

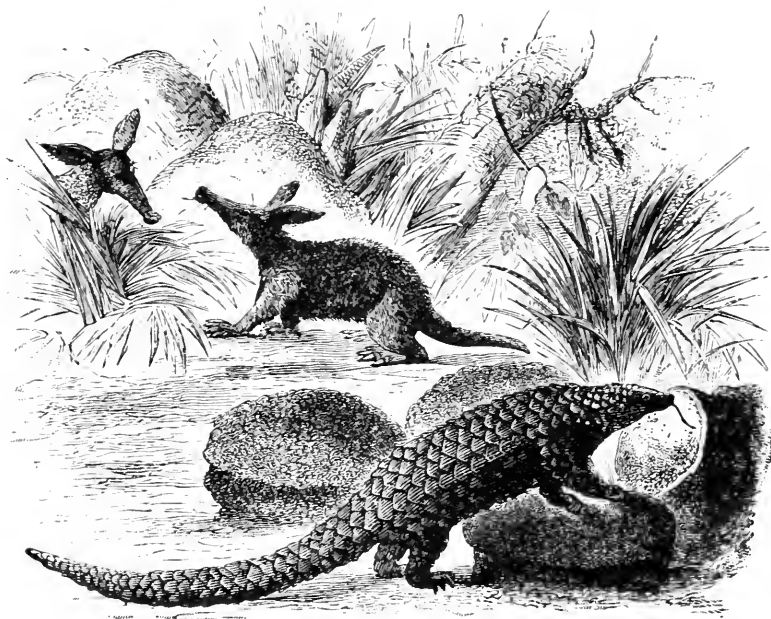


FIG. 38.—AARD-VARK AND PANGOLIN.

In Eastern Africa is found another form which has a very broad tail. Some of the species are, while clumsy, very skillful tree climbers.

Allied to these interesting creatures is the aard-vark (see Fig. 38), a South African ant-eater with a long pig-like snout and extraordinary ears. Ground hog is the common name, and it resembles a hog in many ways; but it is a burrowing, underground animal with large,

powerful clawed feet which enable it to make its way into an ant heap with remarkable celerity. The aard-vark spends most of the time in its den, a commodious room in which several adults may usually be found. The rapidity with which it digs is almost beyond belief. One has been sighted on the plains by a hunter and, before it could be caught, it disappeared in a burrow formed in hard soil. When an attempt was made to dig it out, it easily kept ahead of the human worker.

Aard-varks are found over a wide spread of country. They are considered valuable game by the natives and many others, who claim that the diet of ants and the resulting flavor of formic acid lends an additional value to them in a gastronomic sense. I have seen nearly all these animals alive, and recall a pungent, disagreeable odor that would prejudice almost any one against them as a class.

## VII. THE SEA COWS

When the Russians first discovered Alaska and began to send expeditions to investigate what has now proved to be a valuable possession, they found alongshore and in the sheltered bays herds of huge animals resembling seals or gigantic sea lions. The real discoverer was Steller, and the animal was named Steller's rhytina in his honor.

The rhytina was a sea cow, differing in many respects from the seals. It belonged to the manatees, in which the tail formed a broad caudal fin instead of feet as in the sea lion. The rhytina was a magnificent specimen of a large animal, resembling a manatee in general shape, but having a whalelike tail. Large individuals attained a length of thirty-five feet and a weight of nearly four tons. Without means of defense, heavy, almost colossal, living on land as well as in the water, and browsing on the seaweed alongshore, the rhytina was a conspicuous mark for the whites, who proceeded to destroy it, partly in wanton sport, and partly to supply the larder.

It is well to be charitable, but there is every reason to believe that the great sea cows, one of the wonders of the animal world, were wiped out of existence to gratify the brutal pleasure of ignorant Russian sailors, as in a few years after its discovery this animal became extinct. To-day specimens are extremely rare, and the skeletons occasionally found bring large sums. There was an excellent one

in the Museum of the Academy of Sciences of San Francisco, before its destruction, from which an idea could be obtained of the appearance of this strange animal.

The skin was very thick and leathery. The fore limbs were like paddles, without fingers. The jaws were toothless, their place seemingly taken by two horny plates, one covering the palate, one in the lower jaw, showing that the rhytina, like the manatee and dugong of to-day, browsed upon seaweed.

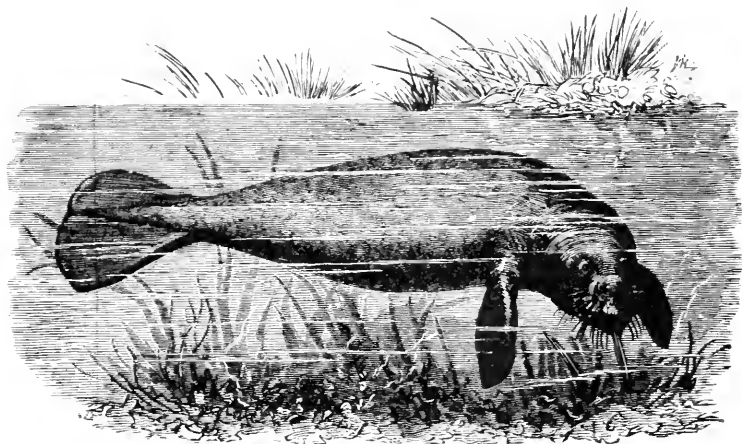


FIG. 39. — THE MANATEE.

In 1741 these animals were discovered by Steller at Berings Island, and in 1769, twenty-eight years later, the last of the race had been destroyed, and the name joined to the large list which includes also the great auk, the buffalo, the dodo, and others either extinct or soon to pass away. But two representatives of this group of animals are alive to-day, the manatee of Florida (Fig. 39) being the best known; but even this is on the verge of extermination.

The manatee is found from the region of the Amazon



to southern Florida. It is almost nine feet in length and resembles a huge seal. The tail instead of being whale-like, as in the rhytina, is flat, but rounded at the corners, or semi-oval. It is an interesting example of a milk-giving animal adapted to life in the water, frequenting the warm rivers, and occasionally coming ashore. The nostrils are upon the upper side of the snout, so the animal can rest just at the surface, unobserved, and breathe. The hind limbs are entirely absent, being represented by the flat tail, which in swimming strikes the water horizontally instead of vertically. The skin is covered with scanty bristles, well developed in the upper lip like a mustache. The individuals observed by me remained concealed under water most of the time. In Florida the manatee is rarely seen, living in and about the mouths of rivers. It often goes far inland, and is now confined to the most remote regions or rivers, practically inaccessible.

The manatee and its cousin, the dugong, are often mentioned in ancient works on natural history. Undoubtedly they are the mermen referred to by the old writers, who easily fell into the error, as the animals when standing upright in the water had a very human appearance. The young are frequently supported on the forearms, in much the same manner as a baby is held by its mother.

Another species of manatee is found in South America. It is not so rare as the Florida form, ranging north to the West Indies, where it lives in small herds and is noted for its affectionate disposition. When the young or the female are attacked, the male almost invariably remains by and so loses its life. One which I observed stood either upright in the water, with its tail touching the bottom, or

with the head bent over, the body thus being much arched. Every six or seven seconds it would rise to the surface and breathe by the valved nostrils, then sink beneath the surface again.

The young of this manatee, one of which is generally born at a time, is easily tamed, and one has been seen to follow its master about as does a dog, though very slowly. A law has been passed to protect these animals from hunters; but the extinction of the manatee is being hastened by the severe winters of the past years. In February, 1894, a strange and unprecedented cold wave swept over the land, freezing the trees, killing the tropical vegetation, and causing untold distress and disaster. At that time but a small herd of manatees was known, and on the following day two were found frozen and dead. These were the survivors of a small herd that had lived for a number of years in the St. Lucie and Sebastian rivers and on the Indian River between the mouths of these streams. They were well known by the people of the vicinity and could often be seen passing beneath the railroad bridge of the Sebastian River. Every winter depleted them. Three were washed up at Palm Beach during the cold wave of 1896, and doubtless none of the herd of eight are still alive, though it is believed that a few may be seen in the Sebastian River. Everything relating to the manatee is of the greatest interest, as it is doomed to extinction. The animal is highly regarded as food along the rivers of South America, the natives following it with the harpoon. Another manatee is found on the west coast of tropical Africa.

Very similar to the manatee is the dugong (Fig. 40),

which ranges from Western Australia to the Red Sea and from Mauritius to the Indian Archipelago. The animal to some extent resembles the rhytina, having a large, whale-like tail, entirely different from that of the manatee. The head is large and deep; the mouth large; the fore limbs are long but clawless. The prevailing color is a deep black.

In former years large herds of dugongs were to be seen, especially at the Mascarene Islands, where they browsed upon the beds of seaweed; but they were, unfortunately, considered dainties and were killed off by the natives.



FIG. 40. — THE DUGONG.

Dugong oil is valued in trade. To supply this commodity a fishery was established in Australia some years ago, which has almost resulted in the destruction of the animal in that region. The male dugong has large incisor teeth; but in the female the teeth do not penetrate the upper jaw sufficiently to be of any use. They grow with the skull and are really tusks sheathed in the bone of the jaw. Like the manatees, the dugongs are slow, cumbersome creatures, frequenting the mouths of rivers and naturally not timid. They attain a length of twenty-five feet, and when standing upright in the water bear a close resemblance to a human being.

## VIII. THE WHALES

The whales are visible evidences that the age of giants has not passed away. These mighty animals range from fifty to one hundred or more feet in length, being, despite the

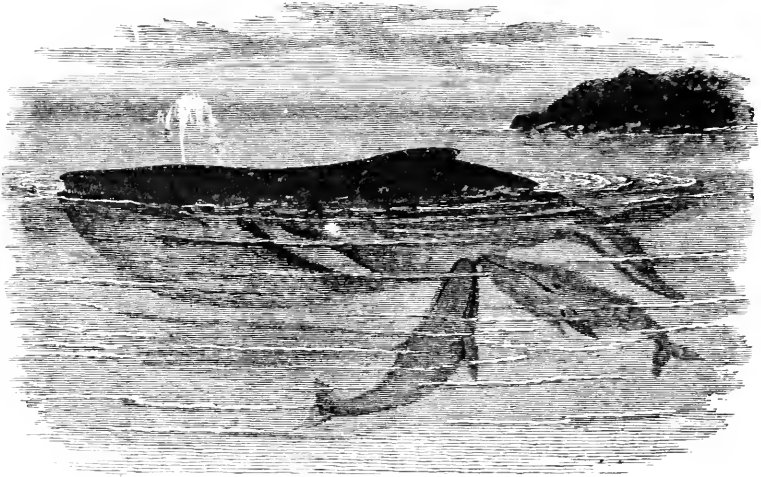


FIG. 41. — WHALE AND NURSING YOUNG.

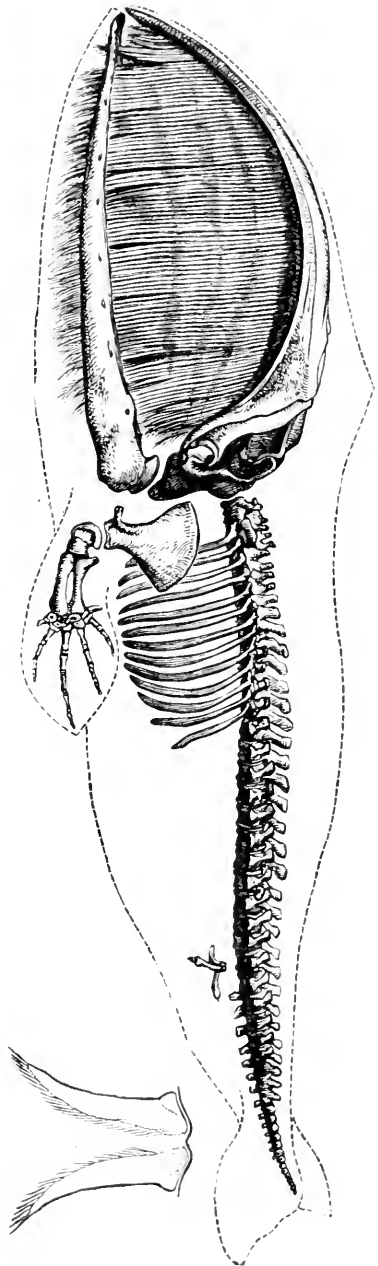
constant warfare against them, still fairly common in many seas. They are carnivorous, milk-giving animals (Fig. 41), adapted to life in the ocean. They are fishlike in form, with a dorsal fin. The two fore limbs are powerful paddles with bones similar to those of the arm and hand of man. The hind limbs are absent or rudimentary (Fig. 42), a flat, fishlike tail taking their place, which is at once a weapon of great power and a swimming screw, forcing the animal along at great speed. I have followed a whale in a power launch, being for some seconds near it and

just above the tail, where the water boiled as though an enormous wheel was working just below the surface; the water being forced upward so violently that it rose above the surface, and doubtless lifted the boat somewhat.

The whales breathe air as other mammals, but they have a provision which enables them to remain over an hour beneath the surface if necessary. This peculiar power, which is rarely exerted, is derived from a large number of reserve blood vessels, which line the interior of the chest and spaces between the ribs, a small portion only of the blood passing into circulation from time to time. The nose or nostrils of the whale are placed at the top of the head so that it can breathe without rising out of the water.

The spout of the whale is not water but steam, — the hot air of the lungs, forcibly shot into the cold air, where it condenses and falls as spray. With this air there is mucus and some water tossed

FIG. 42.—SKELETON OF WHALEBONE WHALE.



upward by the force of the escaping breath. When the whale opens its valves, just before it reaches the surface, this from a distance resembles a column or two of water. But the whale can no more take in water at its mouth and spout it through its nostrils than can a man; and the tales

in some old books to that effect, which still hold in the popular mind, are merest fancy.

The whales are of two general kinds: the toothed forms and the whalebone whales. The former is represented by the sperm whale, in which the teeth are large and confined to the lower jaw, or the dolphins, in which both jaws are armed. In the whalebone whales there are no teeth but a series of elastic plates called baleen, which grow from the long upper jaw, and hang in rows, three or four hundred in number, frayed and bristling at the lower end (Fig. 43). This whalebone is a strainer and

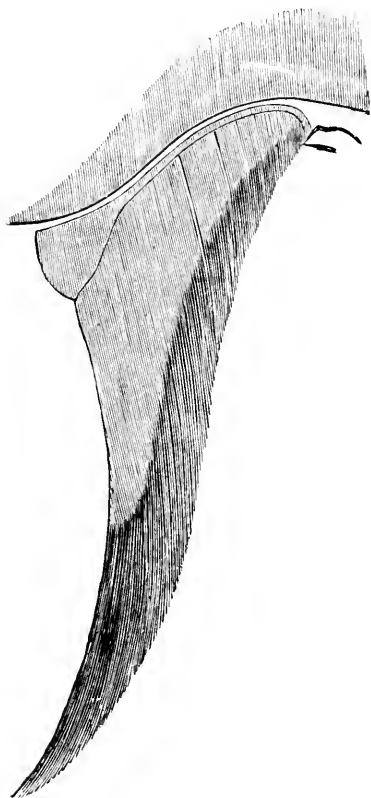


FIG. 43.—WHALEBONE.

forms a trap for the jellyfishes and other fishes upon which the whales rely. In feeding, the animal opens the mouth, the huge lower lips forming a large cavity with the tongue in the bottom and the baleen at the two sides. Swimming slowly through a mass of jellyfishes, the whale fills its mouth, then closes it, the baleen acting as a sieve

to allow the water to escape, but holding the jellyfishes, which slowly pass down the small throat.

One of the best places to observe the whalebone whale is the Santa Catalina Channel, off Southern California, a body of water between the island of that name and the mainland. This is a famous feeding ground for the California gray whale, abounding in vast numbers of jellyfishes of large size. I have seen the water so filled with jellyfishes a foot across and from three to twenty or more feet in length, that from the deck of a fast moving steamer numbers were constantly in sight. At other times smaller forms were seen, constituting such a solid mass that a bucketful could be lifted almost anywhere. Such a condition of affairs has many attractions for the whales; and the daily steamers from San Pedro to Avalon frequently pass one or more, and occasionally so near that the passengers see these giants at close hand. It is not uncommon for a school of whales from fifty to seventy feet in length to swim in the same direction for some time. On a certain occasion one remained alongside the steamer so close that several photographs were obtained of its black back and the "spout." It sometimes occurs that the whales rise in front of the steamer and gambol about, being perfectly harmless, and the captain will stop the vessel and blow the whistle loudly several times. The steamer *Hermosa* has plunged into whales, killing at least two to my knowledge, the animals drifting ashore several days later and each being exhibited as the whale that almost stopped a large steamer. The shock when the vessel struck the whale was almost sufficient to knock over persons who were standing, but occasioned no damage to the vessel.

The whales in this vicinity are very sociable and have been known to follow a yacht and to lie by it for several hours, perhaps assuming that the vessel was another whale of some kind.

A whale followed a ship from San Francisco to a South American port, several thousand miles, and could not be driven away by bullets, though an effective method would have been to pour over ashes and oil, any impurity in the water being offensive to the huge animals. Several years ago a large school formed off Santa Catalina Island, occupying about five acres, for several days, boats going out to watch their majestic evolutions. I saw one individual rise out of the water until it appeared to stand on its tail, resembling a rock rising from the sea.

While colossal and cumbersome in every way, the whale is very active. In the harbor of Bermuda a large whale jumped fairly over a boat from a British man-of-war, the men seeing the tail clear them by twenty feet. All old whalers tell of prodigious leaps they have seen the animals make. The young, generally one or two, are tenderly cared for, the mother often supporting the calf on her flippers. The California gray whale is so solicitous for its offspring that it is very dangerous to approach it when the whales are young, the parent charging boats and destroying them with every evidence of fury. The tail is the principal weapon. The whalebone whale when attacked will lie on the surface and thrash the water from side to side with blows which sound like explosions and which can be heard for several miles.

The whale is one of the most valuable of all animals. A single individual captured by a New London whaler



produced in whalebone \$12,000, and in oil \$3490, or a total of \$15,490. The oil is produced from the fat, or blubber, with which the whale is covered, a provision of nature to protect it from the cold waters it affects, either in the far north or sometimes in the deep sea into which it is supposed at times to make sudden plunges after food. The whalebone whales include the humpback, the California gray, sulphur bottom, silver bottom, razorback, the bow-

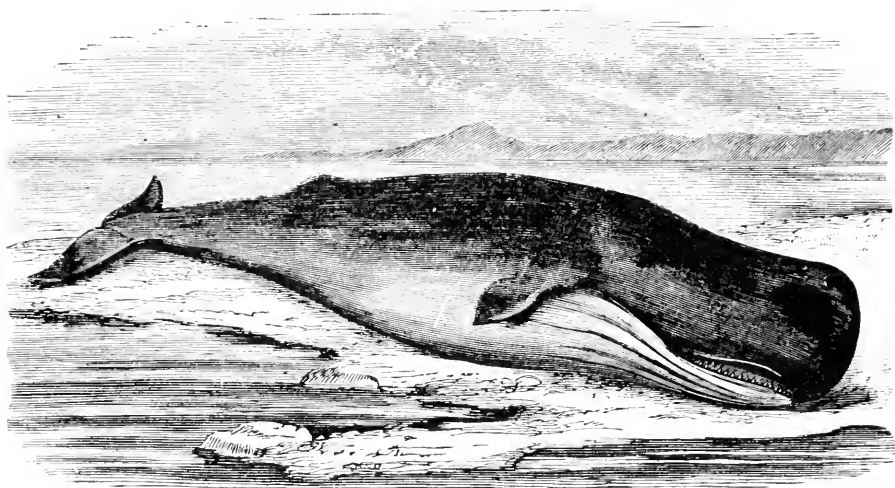


FIG. 44.—THE SPERM WHALE.

head, right whale, Biscay whale, and many others. All depend upon the smallest animals for food, fishes or jellyfishes, and hence are obliged to pass a great part of their lives in the pursuit of the elusive game.

The toothed whales constitute a large and interesting group, the great sperm whale (Fig. 44) being a notable example. It has an enormous, blunt head, with large, tusk-like teeth in the lower jaw, which suggests food of a different nature from the fragile jellyfishes, which are ninety-five per cent water. The principal food of the sperm whale is

the giant squid, enormous specimens of which are found in its stomach and in that of other toothed whales. Dolphins, white whales, and others prey upon fishes, seals, and any living thing.

The sperm whale is a tropical species, found in large schools. It has a single blow hole near the extremity of the snout. The teeth are large, conical, curved, and fit into orifices in the upper jaw, and constitute a trap that has easily crushed large whale boats. The most valuable product of this whale is spermaceti, a clear, fatty liquid found in the head and in various places throughout the body. Another valuable article of the sperm whale is ambergris, used by perfumers. It is supposed to be a secretion formed about the bills of cuttlefishes in the intestines of whales; it is sometimes found floating on the surface.

The throat of the cachelot is large enough to admit the body of a man, that of the whalebone whales being very small. The eye is small. The ear even of the mighty rorqual, which is one hundred feet long, is but a quarter of an inch across. The rorqual is the largest of living animals, few in the ancient history of the world exceeding it.

The male cachelot is a conspicuous object at sea, rising very regularly to respire. It throws up a "spout" which can be distinguished five miles away, and which often has the appearance of a huge fountain on the surface of the ocean. This is due to the fact that the whale allows its breath to escape violently just before it reaches the surface, causing the intervening water to be hurled violently upward, and materially adding to the volume of the "spout." This whale spouts a number of times, about

seventy, occupying twelve minutes; then it tosses its ponderous tail high in the air and plunges into the sea, to remain over an hour searching for food. These whales display great affection for their young, and a bull will often remain by a wounded mate and so lose its life. When enraged, no animal is more to be dreaded. An estimate of its power is shown in the instance of the ship *Essex*, which was deliberately rammed and sunk by a maddened cachelot, the vessel going down in ten minutes. The ship *Ann Alexander* was destroyed in a similar manner; and Captain Scammon expressed the opinion that many vessels never heard from were victims of infuriated whales.

Among the small-toothed cetaceans the white whale (Fig. 45) is a handsome creature common at the mouth of the St. Lawrence and in northern waters generally. It is almost white, has a rounded head, and attains a length of about fifteen feet. One of these whales was brought to New York from the vicinity of the St.

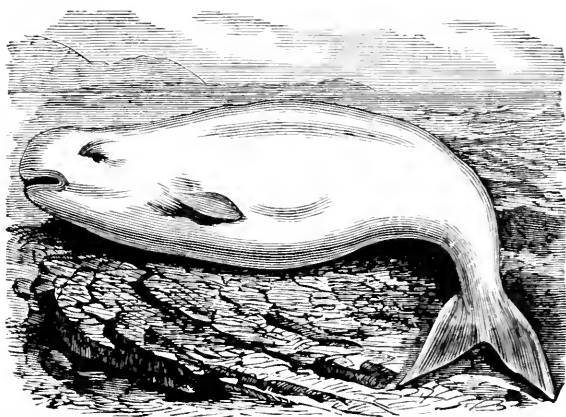


FIG. 45. — THE BELUGA OR WHITE WHALE.

Lawrence, and I watched its final lodgment in a huge tank in the New York Aquarium. It was caught by sinking a box about twenty feet long and eight feet wide in the mud of a bay which these whales enter at high water. While several were in the bay, the entrance was closed

with a net. As the water ran out with the tide, the whales sought the lowest portion, and one was secured in the box. At high tide it was towed to a neighboring town and transferred to a car. The whale was packed with wet seaweed and two or three men accompanied it, giving it constant baths of fresh water at each station. In this way, out of water, the white whale reached New York and was successfully placed in the large tank of the New York Aquarium, where it lived for many months. A white whale was taken to Boston in the same way, and being harnessed to a boat, drew children about. The one I observed was a very docile and interesting creature. The white whale has been seen seven hundred miles up the Yukon, where it preys upon the countless salmon, and I have seen numbers lying on the surface like small white ice floes at the mouth of the Saguenay River.

On our Atlantic shores, a pygmy sperm whale, the kogia, is found. The large sperm and whalebone whales are gradually disappearing, the introduction of steam whalers hastening their extinction. Other species, as the California gray whale, not followed so extensively, are increasing or holding their own; but the days of these huge animals are numbered.

The narwhal (Fig. 46) bears a close resemblance in shape to the white whale, but is spotted like a leopard and has a remarkable tusk, sometimes two, projecting ahead like the sword of a swordfish. In it we see the conventional unicorn, that figures so prominently in the books of two or three centuries ago. The tusk is a tooth, eight or ten feet in length, beautifully twisted, and is possessed by the male alone, the female having two, but slightly developed.

The orcas are the most ferocious of all the tribe, toothed whales from eighteen to thirty feet in length. They are literally the hounds of the sea, bloodthirsty and insatiate. They follow animals of all kinds — seals, sea lions, gulls, large fishes, even the huge horse mackerel, and in a body attack the whale and destroy it. One species with a lavender band near the dorsal fin is very common in the Santa Catalina Channel, California.

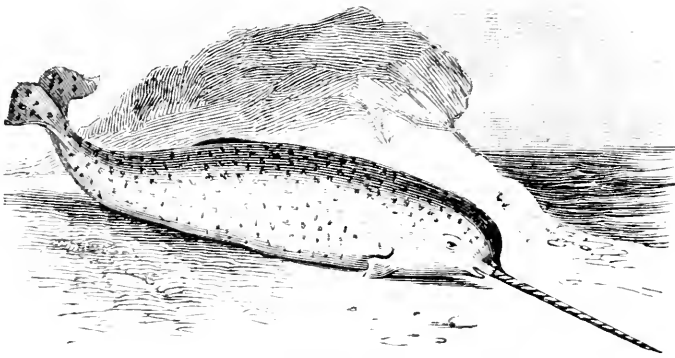


FIG. 46. — THE NARWHAL.

The high, enormous dorsal fins of these animals make them conspicuous objects. They are often very curious, following boats. Opposite Avalon Bay, some years ago, they gave an exhibition of their prowess which fully justified the sanguinary tales told regarding them. They chased a sixty-foot whale in near shore and killed it. Repeatedly the huge and stricken animal leaped high out of the water, and the party of spectators saw the killers clinging to it. They attacked its lips repeatedly and finally literally tore out its tongue and killed the animal.

The ferocity of the orcas of all kinds can only be appreciated by those who have seen them. A band has been

known to steal a whale from a crew of whalers. The orca which I have observed in the Santa Catalina Channel is jet-black above, and lighter beneath, with a clear, light, oblong spot back of the eyes, and a white, or maroon, crescent-shaped band on the back like a saddle behind the dorsal, which makes it a conspicuous object. I have had

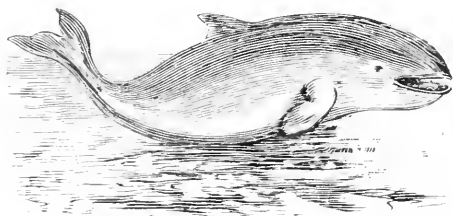


FIG. 47. — THE PORPOISE.

several of these savage monsters pass my boat within a stone's throw, one behind the other, in a line, and I always felt that discretion was the better part of valor.

The grampus and blackfish are similar forms, while the porpoise (Fig. 47) is an example of the smallest of the tribe. The dolphin (Fig. 48) is an equally active animal.

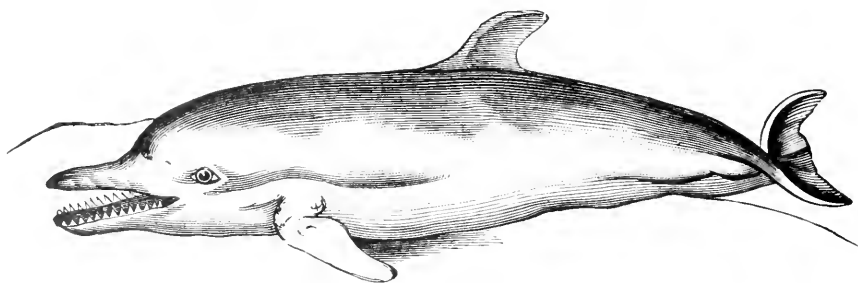


FIG. 48. — THE DOLPHIN.

In many seas it is a familiar object, darting swiftly along before the cutwater of swiftly moving vessels.

The common dolphin is a familiar example of these clever jumpers. To illustrate the jumping powers of the porpoise, a friend in endeavoring to capture a school arranged a line of boats across the entrance of a bay into

which a number of porpoises had swum. When they found themselves trapped, they turned and swam up the bay, then turning came on at full speed and reaching the boats, despite the shouts of the men, leaped bodily over them and escaped.

Several cetaceans are found in fresh-water streams; one, the *Inia*, swims up the Amazon as far as Bolivia. It is but seven or eight feet long and has a long, narrow beak.

Another form, the *Susu*, is found in the Ganges and other streams of India.

## IX. SOME INSECT EATERS

Even the casual student of natural history will observe that almost every group of animals has its enemies or those which prey upon it. The insects are very injurious to vegetation, and nature appears to have adapted a large and varied concourse of animals to reduce their number. So pronounced is this taste that animals of this class are all grouped under the name Insectivora. They have

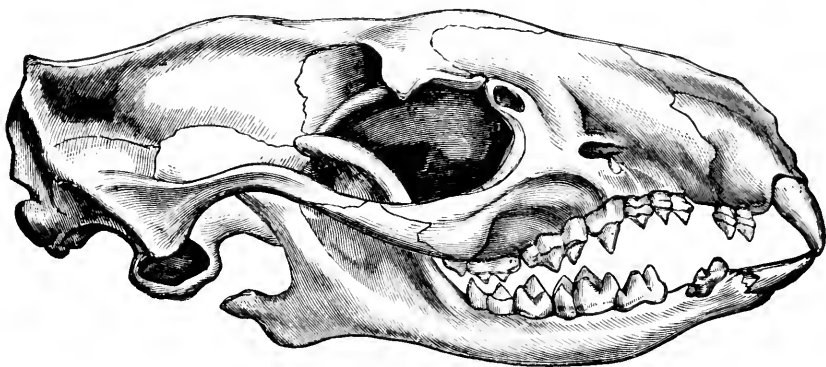


FIG. 49. — SKULL OF AN INSECT EATER.

well-developed teeth, shaped for the purpose, with sharpest cusps, or points (Fig. 49). In a word, they are well equipped for the capture of insect game.

One of the most familiar forms of the insect lovers is the common mole (Fig. 50). This little creature, with pointed nose, beautiful fur, and enormous claws, pushes up the soil in the garden in its search after earthworms and grubs. The common mole is about five inches in length,



and it burrows so rapidly that it readily escapes. By examining its bare, white feet with their enormous claws, the astonished mole hunter can easily understand how the little animal disappears so quickly.

The mole is a valuable ally to the farmer, plowing through the soil and eating every insect it meets. It preys especially upon grubs, and it has been estimated that a single mole will eat 20,000 insects a year. A record was kept by a curious naturalist, and the mole under observation devoured 432 maggots and 250 grubs in four days. Another mole

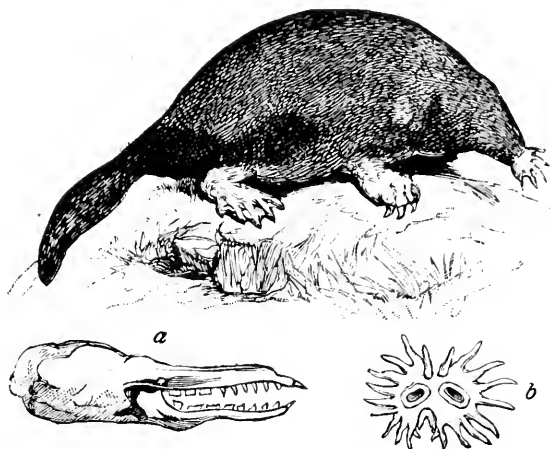


FIG. 50.—THE MOLE.

*a*, skull; *b*, nose.

consumed 872 maggots and 540 grubs in twelve days. In still another test, two moles ate 341 grubs, 193 earthworms, 25 caterpillars, and a mouse in nine days,—suggestive of the vast numbers of insects injurious to vegetation destroyed by these useful creatures.

It is a popular idea that the mole is blind. This is because its eyes are very small and difficult to find. They are perfect, but deeply embedded and easily overlooked. On the surface, the mole is very helpless, but when it is alarmed it rapidly makes an excavation and disappears. The nest (Fig. 51) is a singular and interesting structure, a perfect fortress to facilitate its escape, there being many

byways or streets leading in every direction. In the skeleton (Fig. 52) we observe the powerful limbs, huge

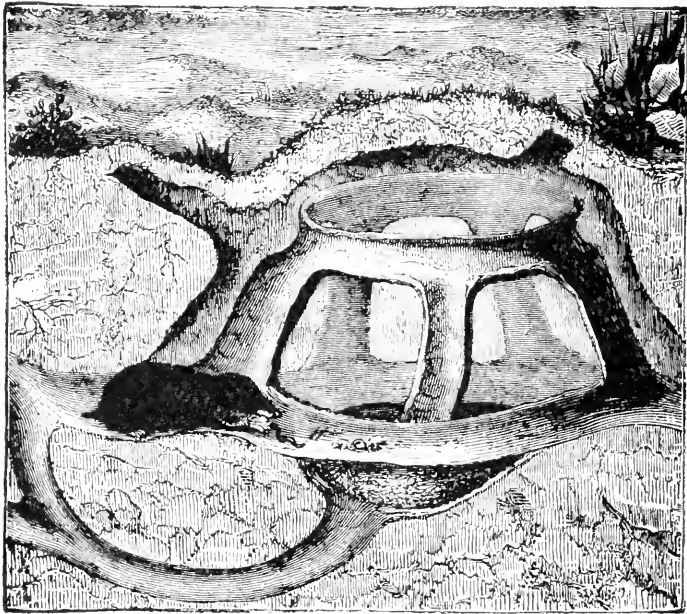


FIG. 51. — NEST OF A MOLE.

claws, long skull with minute, sharp teeth, all telling of the adaptation by nature of this little animal to a life in the ground.

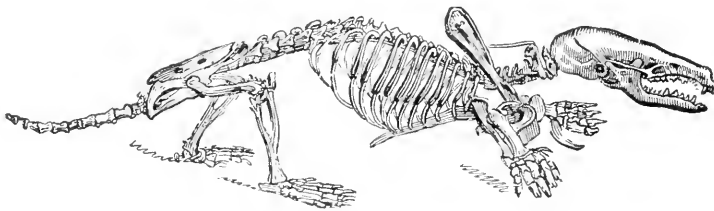


FIG. 52. SKELETON OF A MOLE.

Very similar to the moles are the shrews (Fig. 53), but they have delicate feet and do not burrow, following their pursuit of insects above the ground. The broad-nosed

shrew is a familiar form, with its long nose, large ears, and long tail. It is one of the smallest of quadrupeds, weighing but forty-seven grains. It has a protective odor.



FIG. 53.—THE SHREW.

The hedgehogs (Fig. 54), although very common in England, are not found in the Western Hemisphere. In appearance the hedgehog might be taken for a diminutive short-spined porcupine, as it is covered with spines. It



FIG. 54.—THE HEDGEHOG.

appreciates the value of its defense by rolling itself into a ball when attacked, presenting a surface of spines which is invulnerable to almost all of its enemies. The hedge-

hog forms a burrow beneath the ground and spends the larger part of the time there. In winter it sleeps away the cold days in a state of hibernation or winter sleep. At this time even a close examination of the little sleeper sometimes fails to show any outward sign of breathing. For weeks it lies in its soft nest without apparent life, neither eating nor drinking, its life at the lowest ebb. In the spring it comes out and begins its search for insect food. It uses its spiny envelope for a variety of purposes, one being as a sort of bumper, the little animal having been seen to climb a wall and deliberately leap into the air coiling as it fell, and landing on its sharp spines, to roll away unharmed.

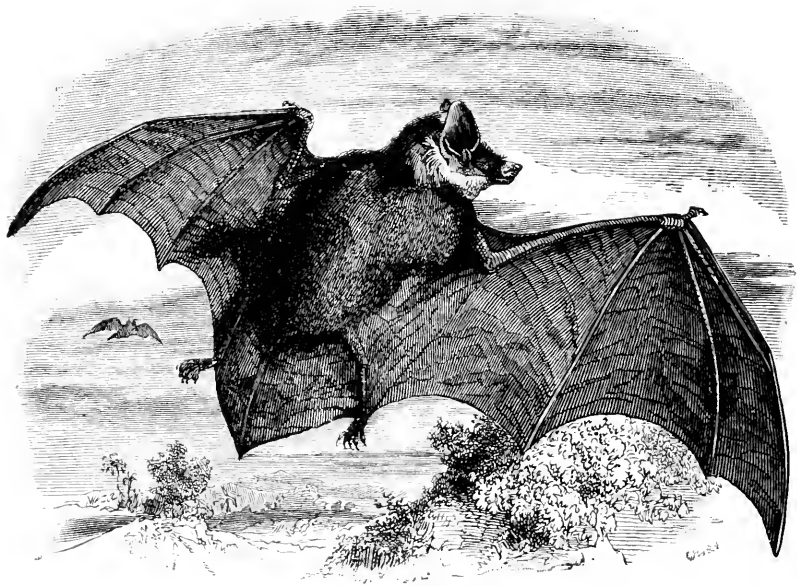


FIG. 55.—BAT IN FLIGHT.

Of all the insect eaters, the bats (Fig. 55) are the best known. They are milk-giving animals, with the fore limbs

modified for purposes of flight. Examining a skeleton of a bat (Fig. 56), the so-called wings are seen to be mere



FIG. 56.—SKELETON OF A BAT.

webs, connecting enormously developed fingers. This web not only connects four long, attenuated fingers, but connects the legs with the last finger, forming a perfect parachute, or wing. The bats are all night lovers, sleeping during the day, hidden away in caves and trees, and coming out at the going down of the sun to feed upon the wing, capturing innumerable gnats and moths to their taste. Caves are particularly affected by the bats. Several are known in the western country which have been used by them for centuries, and at night the silent throng may be seen coming out to spread over the country far and wide. The flight of the bat is as silent as that of the owl, and their sight, or something akin to it, is phenomenal. One night when in the Sierra Madre, California, I felt a gentle breeze playing over my face, and found that it was due to the flight about the room of a very large bat, which swept around in what to me was utter darkness, avoiding every

obstruction. Cords have been suspended in dark rooms to test the powers of the bats, which invariably avoided them. In sleeping, the bats cling to the rocks by their feet, hanging head downward. The thumb is provided with a hook, which they use in walking, though they are very clumsy when on the ground and make but little headway. Certain bats have a sucking disk (Fig. 57) by which they cling to rocks.



FIG. 57.—  
SUCKER ON  
THE WING  
OF A BAT.

The bats, being mainly insectivorous, are deprived of their food at the approach of cold weather. Unable to migrate, as do the birds, they hibernate, or enter upon a long winter sleep. Snugly packed away in caves and the trunks of trees, they sleep away the days until spring comes again with its horde of insect life. Many interesting experiments have been tried with these sleeping bats, showing how like death the sleep is. Air that has surrounded them has been analyzed, and did not show any evidence of having been breathed. A sleeping bat has been placed in illuminating gas for a short time without fatal results, showing that nearly all the functions of life are at a standstill. During this rest the bats are supposed to exist by drawing upon the fat accumulated during the active period. The young of bats, one or two at a birth, cling to the mother and are carried about by her during flight. The sail turned upward with its webs forms a more or less perfect pouch for them.

The so-called vampire bats have earned a disagreeable reputation by their habit of attacking horses in South America. They are small bats, and have been known to stampede a band of horses by alighting on their necks

and haunches. That they attack human beings sleeping unprotected out of doors is not improbable. Many of the bats have a disagreeable odor, almost overpowering in some instances. The largest bats are fruit eaters.

The kalong, or flying fox, of Java, Sumatra, and the Pacific Archipelago, is from four to five feet across the wings. Several of these interesting creatures which I had access to, became very tame, and so far from resenting handling welcomed it. They would put out their foxlike heads to have them scratched, and would scratch my hand with the powerful hook. Their eyes are large, clear, and attractive. Their ears, too, are large. In fact, these animals resemble small foxes endowed with wings. They ordinarily cling to the roost by their feet, head downward, and in walking present an extraordinary appearance, advancing the hooked forearm, clinging to the limbs by it and a foot, and thus making remarkable headway. In their native woods they consort in flocks, and when resting appear like fruit hanging from the branches. They often do great damage in banana orchards. Those observed by me possessed a disagreeable musky odor so strong that their presence could be detected some distance away.

The bats are very solicitous for their young, and when robbed they have been known to follow the little one for a long distance, and even alight upon the robber and permit themselves to be captured rather than desert it. In many species both male and female care for the young, and when two are born, the male of a certain species holds the little one in a pouch.

One of the largest of the insect-eating mammals is the colugo, a large, foxlike animal which resembles a flying

squirrel inasmuch as it has a weblike membrane which connects the fore and hind limbs and the tail. When the colugo springs into the air, this membrane becomes a perfect parachute, bearing it up. The movements of the animal in flying are very graceful. Running upward, it boldly flings itself into the air, swooping downward, perchance rising to grasp a tree, to mount it rapidly, and then to continue the flight. The colugo carries its young about with it in these aerial pastimes. There are two species of these animals living in Borneo, Sumatra, and Malacca. It is a night-loving animal, rarely moving abroad after dawn, but being very active from sundown on.



## X. THE GNAWERS

A large and interesting group of animals are called rodents, or gnawers, from the fact that they are provided with powerful chisel-like incisor teeth (Fig. 58) to enable them to cut trees, limbs, and nuts, upon which they live or

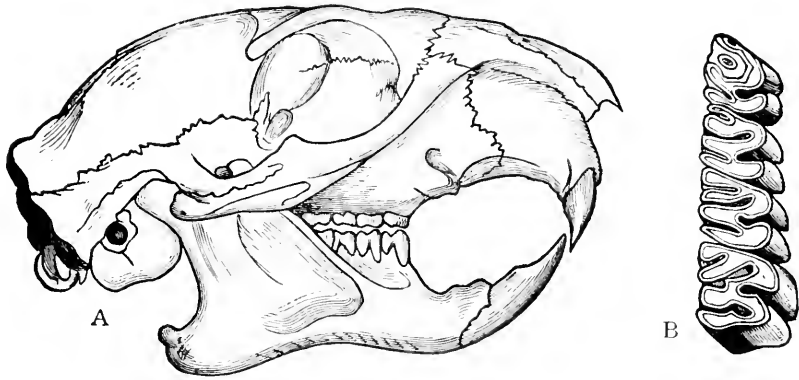


FIG. 58.—INCISOR TEETH OF A RODENT.

depend. They have no canine teeth, which form so prominent a feature in the carnivorous animals. The molar teeth are flat, and the lower jaw is so articulated that it moves forward and back instead of up and down.

Animals of this kind are typified in the squirrel, which is a familiar object, sitting upright and gnawing into a hard nut with its powerful teeth. The beaver, which chisels down large trees, is another member of this group.

The rabbit and hare are familiar examples of rodents. The incisor teeth (Fig. 59) of these animals are sharp and powerful, making them troublesome to the farmer from

their habit of chiseling down or girdling trees. They have a wide range. The European hare (Fig. 60) is one of the

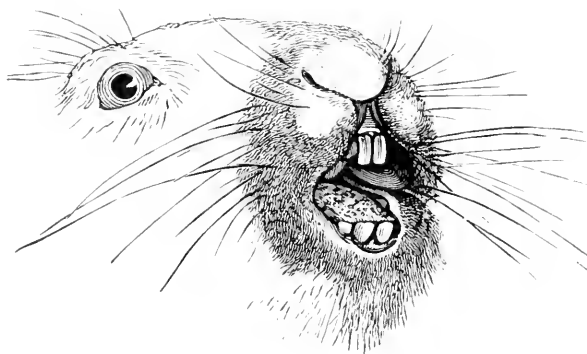


FIG. 59. — MOUTH OF A RODENT, SHOWING THE GNAWING TEETH.

fleetest animals known. The West American form, the jack rabbit, is even fleet, but I have rarely seen one that could not be run down with a fast horse and good grey-

hounds. I have spent many hours in this pastime in California, where the hare is a menace to the farmer. No sport is more exciting or exhilarating than to follow the fleet animal in the open country, where it has the advantage and leads the horse, rider, and hounds into dangerous paths. Chasing hares in an inclosure, when the animal has no possible chance for its life, is not to be commended. Fol-

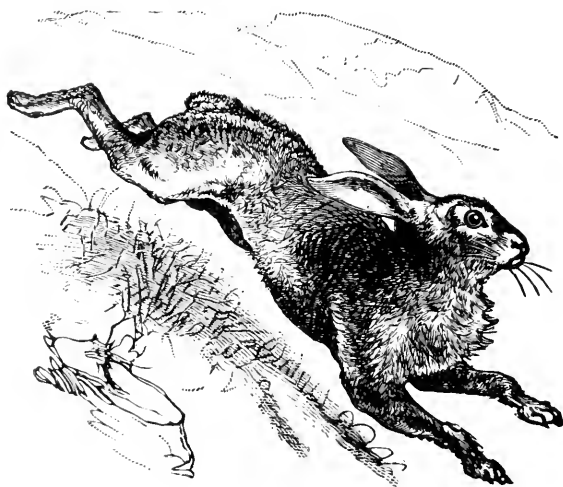


FIG. 60. — THE EUROPEAN HARE RUNNING.

lowing them in the open country is far more dangerous than fox hunting. The jack rabbit is found in such vast

numbers in the San Joaquin Valley, that it is found necessary to have rabbit drives at certain intervals. Men gather from all the neighboring towns, and form a line several miles long and drive the pests into a corral built for the purpose, where thousands are finally hemmed in and killed. In Australia the common rabbit has become such

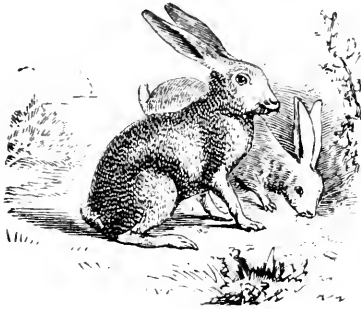


FIG. 61.—THE HARE.

a pest that it is almost a national calamity, and thousands of dollars are expended annually in killing it off.

Hares differ from rabbits very materially in their habits. They have long hind legs (Fig. 61), while rabbits (Fig. 62) have very short ones. The hare forms its

nest on the surface and never makes a burrow, while the rabbit burrows and makes its nest beneath the ground. I have never but once seen a hare take to a burrow when hard pressed. The polar hare, as its name indicates, lives in the far North, where its white coat affords it no little protection from the huge owl that preys upon it. One rabbit found in the Mississippi region takes to the water when followed, swimming and diving with great skill, in marked contrast to the rest of the group, which as a rule avoid water.

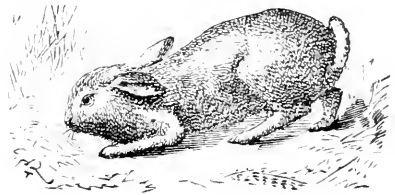


FIG. 62.—THE COTTONTAIL RABBIT.

All the domestic rabbits sprang from the common English rabbit. In 1901-1902 a singular craze for so-called Belgian hares spread to some extent all over the country.

In Southern California many farmers and others went into the Belgian hare business. Ordinary English rabbits were imported under high-sounding names. Extraordinary prices were paid for rabbits, in some instances five hundred dollars, and pedigrees were published extolling Rex I or Dominicus II. Rabbitries sprang up everywhere, and special



FIG. 63. — THE SQUIRREL.

papers were published on the Belgian hare. Certain men and women became professional Belgian hare judges and traveled about the country from town to town. The papers, and even magazines, were filled with accounts of the hares (which were rabbits) and their owners. Suddenly it was discovered that people would not eat rabbit all the time even if it was given away, and the great Belgian hare

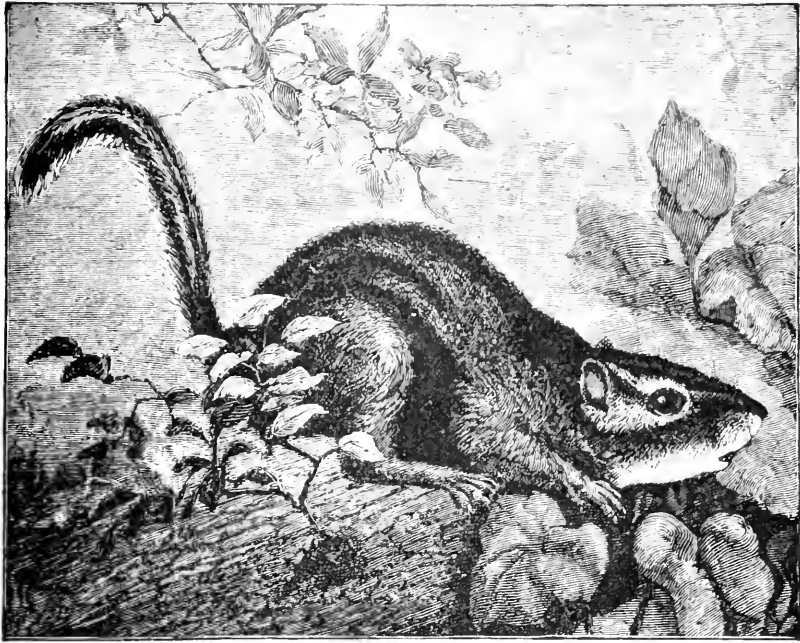


FIG. 64.—THE CHIPMUNK.

bubble exploded. On many a highway, big fat English rabbits could be seen browsing, — once noble scions of Rex I, but now released and driven away to become tramps of the tribe of rabbits.

The most attractive of the gnawers are the squirrels (Fig. 63), which lend life and beauty to every forest or byway. The old stone fence of New England is the squirrels' highway, and bounding along they are typical of innocence and gayety. Their long, bushy tails, their bright eyes, intelligent faces, and interesting postures all endear them to man. One that I found in the Sierra Madre had an enormous tail, recalling that of a fox, a charming sight among the bays and manzanitas and sycamores of the deep canyons. The small forms, the chipmunks (Fig. 64), are even more beautiful. They are

found almost all over the country, and everywhere add to the charm of life in the forest.

Among these animals the flying squirrels are perhaps the most interesting (Fig. 65). They have the fore and hind limbs connected by a web-like membrane which they use as a parachute in plunging down from lofty trees.

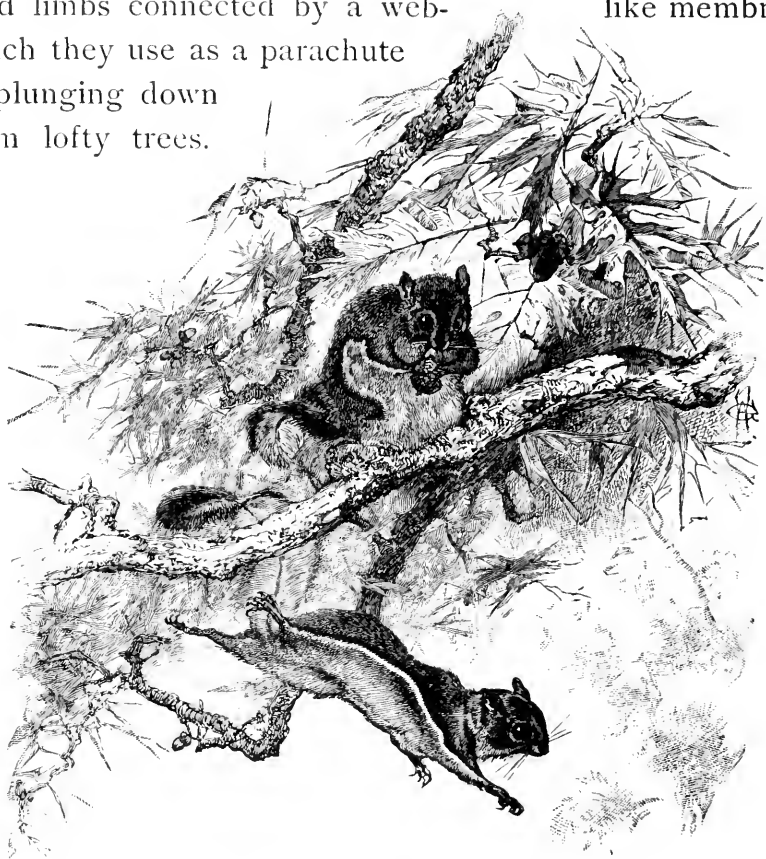


FIG. 65. — FLYING SQUIRRELS.

The sail-like skin bears them aloft and materially aids them in their so-called flight. Of the various pets I have had, a flying squirrel appealed to me most by its fascinating ways. It hid nuts behind all the pictures in the room, and drove an old and dignified lady visitor almost into hysterics by going to sleep in her bonnet and coming

out when it was placed upon her head.

When I was at my desk, it would often insist upon sitting upon my hand or on the inkstand.

One night I was awakened by a roaring which I supposed was in my head, but as I rose it partly ceased, and investigation resulted in the

discovery of the flying squirrel between the pillow and the pillow case, directly beneath my ear, wedged into the soft feathers, where it was humming or purring after the fashion of its kind.

The Southern fox squirrel (Fig. 66) is a large and beautiful form with a foxlike tail. The thirteen-lined squirrel (Fig. 67) is one

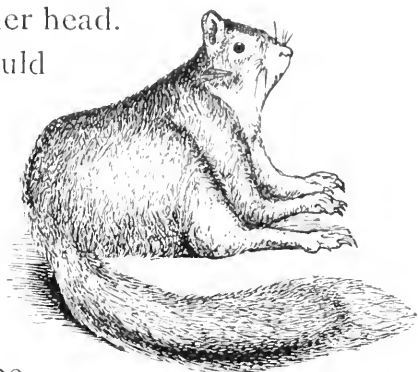


FIG. 66.—FOX SQUIRREL.



FIG. 67.—THIRTEEN-LINED SQUIRREL.



FIG. 68.—BLACK SQUIRRELS.

of the most conspicuous, while the gray and black squirrels (Fig. 68)

are perhaps the most common, the latter forming popular game for sportsmen. The squirrels migrate sometimes, but not with any regularity.

At certain seasons a migrating instinct seems to develop, and large bodies have been seen moving in a given direction, swimming streams, and doubtless seeking fresh feeding grounds.

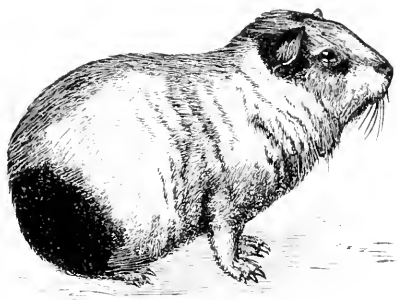


FIG. 69. — GUINEA PIG.

The guinea pig (Fig. 69) is a native of South America, but has been carried all

round the world as a pet. Its near relatives are the cavies, the agoutis, and the capybara. The last named is the largest of the gnawers, resembling a small pig, but having huge, chisel-like incisors. An interesting water-loving form of South America, at home in either salt or fresh water, is myopotamus (Fig. 70). It suggests that most

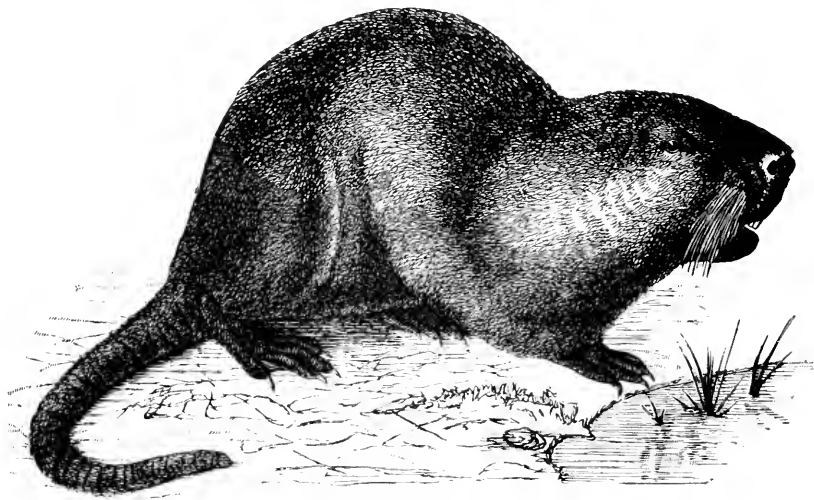


FIG. 70. — MYOPOTAMUS.



remarkable of gnawers, the beaver (Fig. 71), which formerly was very common over a large area in America, but is now becoming rarer every year.

The beaver has a large, broad, flattened, scaled tail, — perhaps the most singular caudal appendage known, — which it uses as an organ of locomotion, as a rudder, and for other purposes. There are five toes upon each foot, the hinder ones being webbed as swimming organs. The first white visitors to America found in New England and

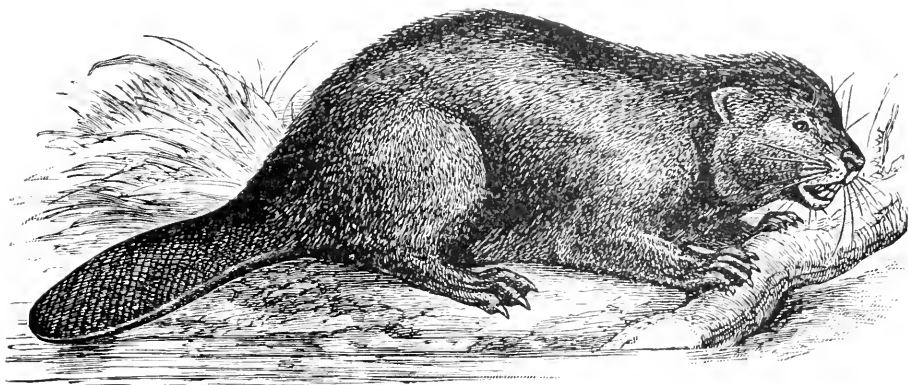


FIG. 71. — THE BEAVER.

other states singular dams, erected with all the skill that an engineer would employ. When told that the work was performed by an animal, they did not believe it, but they were soon convinced by seeing the beaver at work.

Beavers are essentially water animals. They build their homes or nests in the water, and dam up streams to produce just the effect and depth of water they wish. When a locality has been selected, the beaver decides that deeper water is necessary for its comfort and safety, and it lays plans for a dam just as a man would. Large trees at the side of the stream are gnawed off by the sharp, powerful

teeth. The beaver cuts the tree all around with upward and downward strokes until it resembles an hourglass (Fig. 72). The amount of work thus accomplished can be imagined when it is known that poplars nine feet in circumference have been found cut half through. The logs are used in forming the braces for the dam, and are often very skillfully placed, curving against the torrent. The

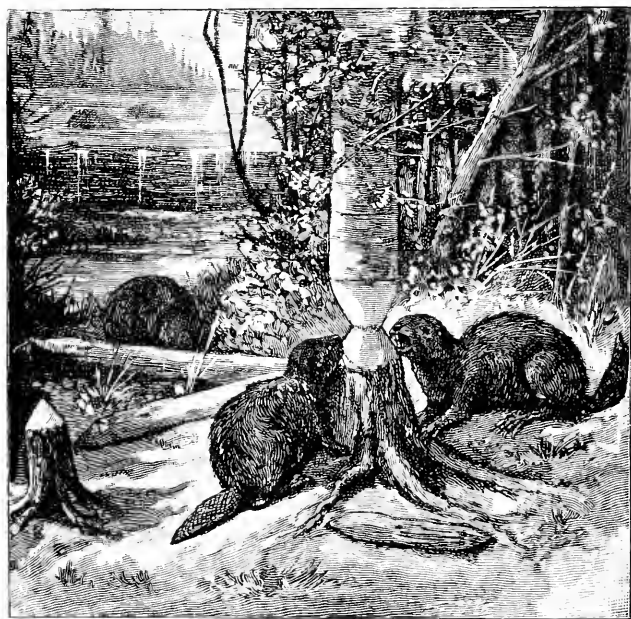


FIG. 72.—BEAVERS AT WORK FELLING A TREE.

dam proper is built of mud, brush, and refuse of all kinds, which the beavers bring and heap up, placing logs of various sizes over it until a perfect dam is the result. This brings the water up to the required level. The

houses are two-storied. The lower story is in the water, and is used as a sort of storeroom; the other is just above it. In the latter the beavers live, the opening being under water, so that the beaver can escape if attacked. In one of these strange abodes a family of from six to twelve beavers lives. They separate in the spring, but return in the fall to repair the winter home, which when frozen on the outside is a veritable fortress. Even the fierce wolver-

ine — the implacable enemy of the beaver — finds it difficult to break into one of these houses.

One of the most singular of all the rodents, so far as appearances are concerned, is the porcupine (Fig. 73), in which the body is covered with stiff, black and white quills from three to twelve inches in length. One of the well-es-

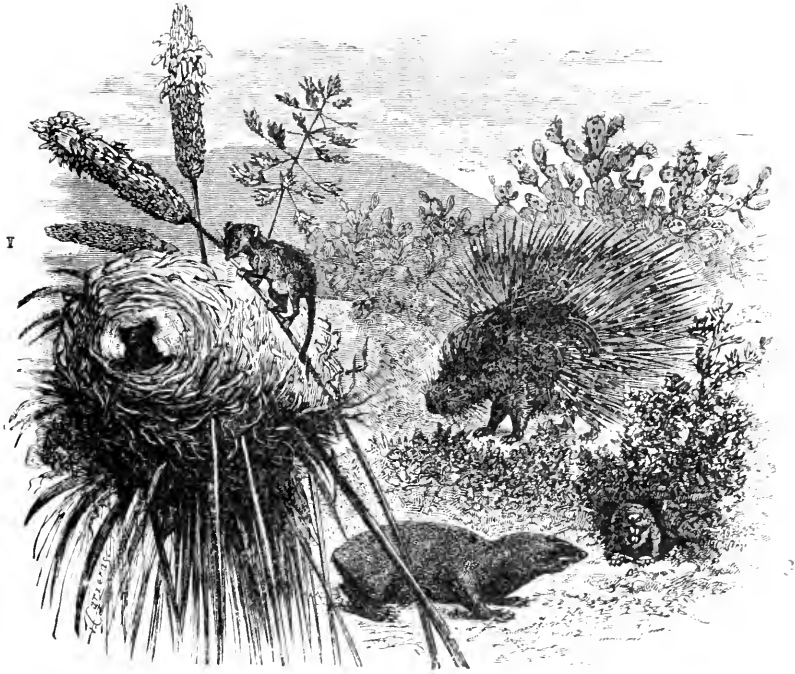


FIG. 73. — A GROUP OF RODENTS.

1, Field mice; 2, Porcupine.

tablished fictions of zoölogy is the story that the porcupine can throw its spines like arrows, and many persons can be found who will testify that they have seen the act. A large porcupine was once placed in a box with a rabbit, and irritated in every way to demonstrate to some doubters that such an act was impossible. It was very easy to see how the story became current. When attacked, the animal

threw its tail and its body in the direction of the rabbit so quickly that the movement was almost invisible. Several quills brushed against the smaller animal and remained sticking to it; yet those who did not observe the act were positive that the quills had been thrown — an act quite as impossible as it would be for a man to throw his hair at some annoying enemy.

Porcupines are found in the temperate regions of the Eastern and Western Hemispheres. They live in burrows very much after the fashion of rabbits, and in winter undergo a partial hibernation, sleeping part of the winter. One of the largest, and a formidable creature, is the Canada porcupine, about three feet in length and much lighter than the others. The European crested porcupine has spines twelve inches in length, those on the tail being hollow and very loosely attached. When the animal is undisturbed, the long quills lie flat; but does an enemy appear they rise upward with a rustling, hissing sound, — a menace in itself, — and the animal stands “humped up” with its array of spines turned in every direction. Against such an array few animals have the temerity to advance. In South America the porcupines are tree lovers, and have more or less prehensile tails by which they cling to branches after the fashion of the opossum.

Allied to them are the chinchillas, found in the Andes at an altitude of twelve thousand feet, and the curious viscacha, common on the lofty plateaus of South America. These little animals have a peculiar habit, calling to mind that of the bower birds, of collecting about their burrows curious objects, as stones, colored shells, flowers, or any articles of a bright or unusual nature. So well established

is this habit that once, when a member of a pack train lost his watch, the natives began to search, not along the trail, but on the vis-cacha burrows by the side of the road, and soon returned with the watch, which had been dragged there by one of these mischievous collectors.

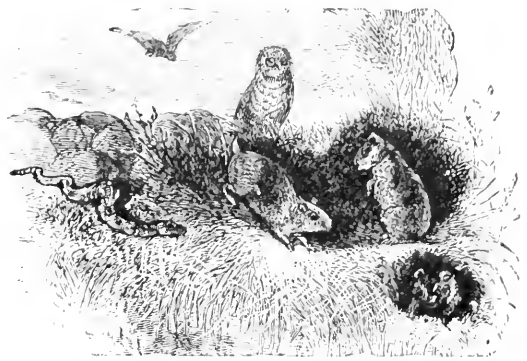


FIG. 74. — PRAIRIE DOG.

The prairie dog (Fig. 74) is a well-known rodent of the Western plains. It forms burrows, and is seen in large communities sitting on its haunches, and diving out of sight at the slightest warning. It is often said that the prairie dog, the rattlesnake, and the burrowing owl live in the same burrow on terms of friendship; but the truth is that the prairie dog builds the burrow, and the owl, too lazy to dig for itself, sometimes forces itself upon the family, while the rattlesnake, with a



FIG. 75. — GOPHERS.

fondness for young prairie dogs or owls, affects the burrows for that purpose, and sometimes as a retreat.

In the West, particularly in Southern California, there are several small ground-loving, gnawing creatures called gophers (Fig. 75), the enemies of every gardener. In general appearance they

resemble rats, but they have short tails and are entirely subterranean in their habits. They rarely if ever come above the surface, and literally honeycomb the country they inhabit. I know of instances where water poured into a den ran out nearly half a block distant. It is almost impossible to drive them away by this means, and so small traps are employed. Some ranchers keep large numbers of cats which become very skillful in lifting the gophers from the entrances of their dens. The

gophers have enormous cheek pouches which they fill when eating. They will come to the surface, pushing the earth away with their chests and broad paws,

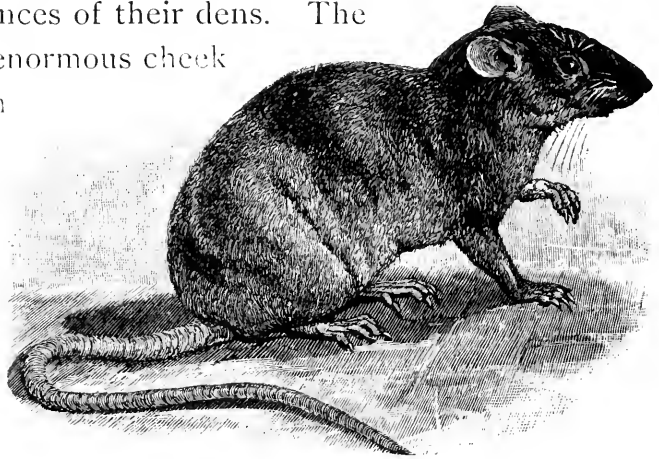


FIG. 76.—HOUSE RAT.

and if no vegetation is near will sometimes run rapidly a foot or more to some plant. If alarmed, they dart back with the greatest rapidity, tail first, never, at least in my observation, turning around. They form nests near the surface, which they line with grass, and in which the young are born and reared. I have tried to tame the gophers, but found it impossible, the long, chisel-like teeth being employed at the slightest opportunity. They are very cunning in their depredations, rarely coming to the surface in an open place in a garden, but preferring some secluded spot. I have seen choice flowers, as carnations, waving

wildly, then shooting downward out of sight, being dragged down by the clever gopher working at the roots.

Allied to them are the house rats (Fig. 76) and the house mice (Fig. 77), both among the enemies of mankind. One of the largest rats is the Bandicoot rat, which in India is nearly fourteen inches in length. The rats are very intelligent and



FIG. 77.—HOUSE MOUSE.

clever, but do great damage to man. Being the carriers of disease, their mere presence is a menace. In many large cities a price has been placed upon them, it being known that they are transmitters of the bubonic plague and possibly of other diseases.

The rat is not a native of America. It was introduced by sailing vessels. It came originally from Central Asia,

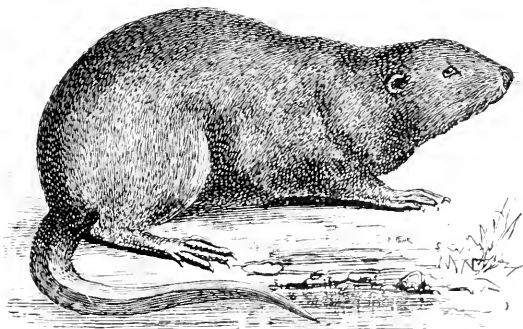


FIG. 78.—THE MUSKRAT.

appearing first in Russia, in 1737. The first ones reached America in 1775, becoming known as the wharf rat, a menace to docks and embankments. The black rat, as well as the house mouse, so universally

distributed over the country, is an importation from Asia.

The muskrat (Fig. 78) is famous for its house, made

of rushes and mud, and the long tunnels in river banks. The harvest mouse forms a dainty nest among the grain above the ground, while the deer mouse (Fig. 79) is a



FIG. 79.—THE DEER MOUSE.

most attractive little animal, and is often kept as a pet. The jumping mice (Fig. 80) are graceful creatures with powerful hind legs and long tails, leaping

great distances like miniature kangaroos.

Equally interesting are the jerboas, while the American pocket mouse, *dipodomys*, is a fascinating little creature. It has a large head, bright, expressive eyes, long mustachios, and a slender tail with a white stripe and tuft.



FIG. 80.—THE JUMPING MOUSE.

Its hind legs are long and powerful, its fore legs are diminutive. In fact, it is a diminutive kangaroo in appearance. They are common along the Sierra Madre in California,



and I have kept them as pets. They have enormous cheek pouches, which they fill, and then they return to their burrows and eat at their leisure. They are very gentle little creatures and readily tamed.

One of the cleverest of the ratlike animals is the California wood rat, very common in the San Gabriel Valley, where it builds enormous nests. Several within gunshot of my home are marvels of constructive ability. The animal resembles an ordinary rat, but has larger eyes and ears, and is particularly agile, leaping long distances. It would be an interesting pet were it not for a disagreeable musky odor.

The nest is either in a tree or on the ground, generally at the base of an oak, where from one to twenty, or even fifty, bushels of leaves and rubbish of all kinds is collected and piled up to form a perfect protection from the rain. Generally a place is selected where there is a branch touching the ground, and this, covered with the leaves, is utilized as a rafter. In the center of the nest is a room for the young, and a day home formed of the softest material procurable, and near by it is another apartment filled with food of various kinds. From these rooms extend numerous paths in various directions and one or more into the ground, so that it is almost impossible to capture a wood rat without having a watcher at each entrance. Once in the tree top, the wood rat leaps from limb to limb with all the agility of a squirrel.

A wood rat I kept as a pet permitted itself to be handled with impunity. Like all these animals it had the singular habit of stealing everything available. The first day of its capture it climbed to a table, ascended a vase and cut off

a rose larger than itself, which it hid in a closet. To this it added a cigar and other objects, all of no value to itself; and this is the peculiarity of the wood rat, about whose eccentricities much could be written.

In one camp, the wood rats stole candles, tooth brushes, papers, matches, corks, soap, a brush, combs, collars, everything they could carry off, working always at night, and hiding the articles among the rafters of the cabin.



FIG. 81. — LEMMINGS.

In another camp a watch disappeared and was found in a wood rat's nest two hundred feet away. These rats in one night took barley enough from a sack to fill the tall boots of a driver, — a vast work performed merely in mischief.

The lemmings (Fig. 81) are ratlike creatures of Northern Europe, famous in the annals of the marvelous as migrants. At certain times they collect in vast numbers and move over the country like an army of locusts, eating everything as they proceed. They hold to one general

direction despite enemies. They swim rivers, and once in Russia, when the swarm was confronted by the sea, all swam into it, impelled by this strange instinct of unrest, the entire horde being lost.

This instinct is not peculiar to the lemmings alone. In Brazil a rat plague occurs every thirty or forty years, apparently when a certain seed fails. Then the animals swarm over the country in large numbers. A similar rat migration has been observed in Ceylon, when a certain plant dies out, generally once in seven years; and in Chile rat plagues have been observed whenever a certain bamboo fails, generally once in fifteen or twenty years. These movements are caused doubtless by the failure of crops and the unusual increase of the animals, which move on to obtain a better food supply.

## XI. SOME HOOFED ANIMALS

The feet of mammals, if contrasted, afford an interesting study, showing the curious modifications which adapt the milk givers to many strange and opposite conditions of life. The feet of the whale have disappeared, and

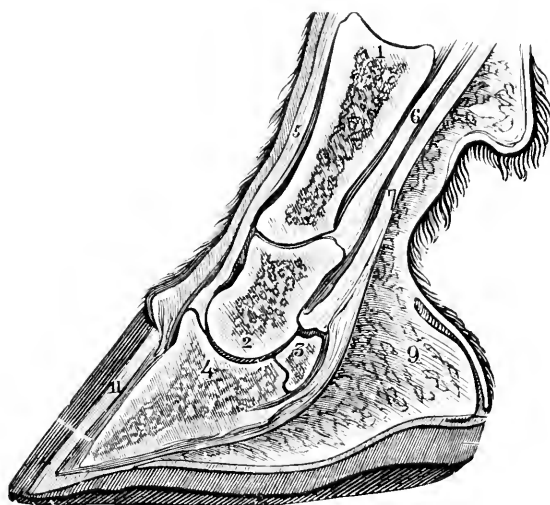


FIG. 82.—HOOF OF A HORSE.

those of the seal are more like fins. In the moles they are digging machines, in the bat they are adapted to clinging, and in the duck moles they are paddles. Many, as in the kangaroos, are formed for leaping. Almost every diversity is found, and

none are more interesting than those called hoofs (Fig. 82), in which the toes are encased in horny enlargements, or are provided with blunt, padlike nails. A similar comparison of entire limbs is not without interest.

The hoofed animals include a large number valuable to man, as the horse, camel, pig, elephant, and others. The hyrax (Fig. 83) is one of the smallest, not much larger than a rabbit; yet it has feet which recall those of the rhinoceros, being protected by pads. The toes, four

in front and three behind, are encased in hoofs. The hyrax is common in Africa. The Syrian hyrax is supposed to be the shaphan of the Bible. They produce the secretion known as hyraceum, which is employed in the manufacture of perfumery.



FIG. 83.—THE HYRAX.

The rhinoceros is one of the largest and heaviest of animals. It is now confined to the tropics, but in former years one species roamed over the northern countries and was adapted for life on the edge of the Arctic regions. The remains of several of these huge creatures have been found entire, having fallen into crevasses in the ice and been so frozen up in nature's cold storage as to be preserved as monuments of a lost race. In 1771 a specimen was secured that was almost completely covered with hair. It had been buried in the frozen tundra by the banks of the river Wilui, Siberia, for possibly thousands of years. Its horn was four feet in length, showing it to have been a powerful and dangerous foe to any animal. It was doubtless a contemporary of the mammoth.

To-day the rhinoceros is confined to Africa, India, and the adjacent islands, as Sumatra. Several species are known, and all are distinguished by having growing upon the muzzle one or two horns, from one to three feet in length. These horns have no connection with the bone. They are composed of hairlike fibers closely joined, and

in some instances are slightly movable. They are enveloped in a thick, leathery, armorlike skin, arranged in folds, having a very artificial appearance. Few animals possess so effective a weapon, and few are so brutish and vindictive. When alarmed, the rhinoceros usually lowers its head and charges; and if the enemy stands, it is ripped and torn by an upward stroke of the daggerlike horn that is usually fatal.

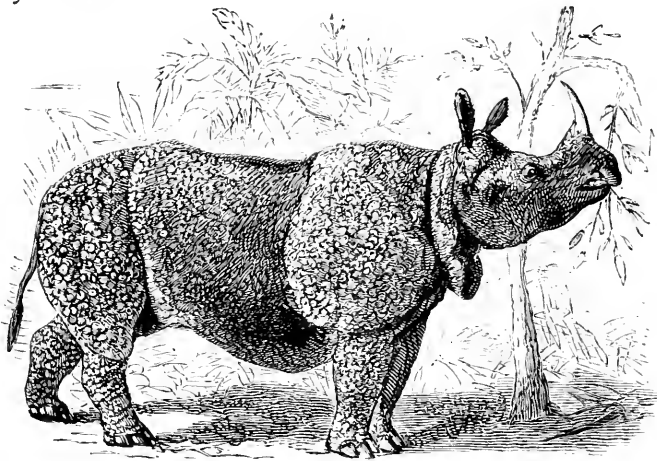


FIG. 84. — THE INDIAN RHINOCEROS.

The Indian rhinoceros (Fig. 84) is of gigantic stature, weighing three or more tons and being ten feet in length. It has one powerful horn often three feet in length. A Sumatran species has no horn. The African species (Fig. 85) is provided with two horns, one very long and sharp, and another shorter. The huge elephant is no match for this ugly brute, which does not know the meaning of fear. The feet of these animals are provided with pads, the three toes with small hoofs. They are found in dense forests or swampy places. Hunters who have stolen upon them have seen the birds called rhinoceros



FIG. 85. — THE AFRICAN RHINOCEROS.

birds and others perched upon their backs, and these, uttering the first alarm, often save the lives of the huge beasts, as the eyesight of the rhinoceros is very poor, though its scent is keen. The birds see the enemy and by loud cries alarm their host, which goes plunging through the brush, sometimes in the wrong direction.

The tapirs (Fig. 86) are large and interesting animals from South America and the

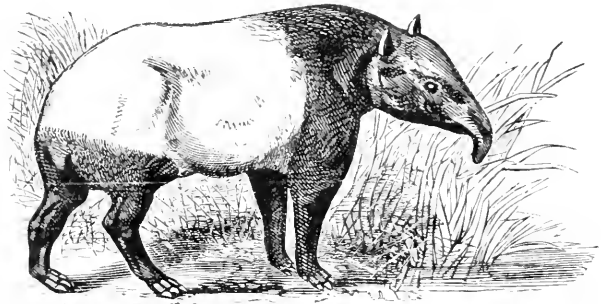


FIG. 86. — THE TAPIR.

Malay Peninsula. They have a short, fleshy, proboscis-like nose. Their skin is nearly hairless, and a fleshy, hairy crest gives them a ferocious appearance which is not borne out by their methods, as they are very mild and

inoffensive. They easily fall victims to the great cats, the jaguar and cougar, of South America. The South American tapir has a wide range over the continent. It is a good swimmer, readily taking to the water when followed. Two species of tapirs have been found in Central America.

The tapir of the Indian Archipelago is about eight feet in length and forty inches high at the shoulder, a very striking creature, due to the stripe of white down the middle section of the body like a gigantic saddle. The young number one at birth. The tapirs come of a long line of ancient and singular animals which roamed the earth millions of years ago. An extinct species, the paleotherium, found in the Paris Basin, was a three-hoofed animal, possibly related to the horses.

Of all animals, the horse is best known to man. The ancestors of the present animal, according to our geologists, were horselike creatures from which have descended not only the horse, but the zebra, the quagga, and the donkey. In the museums, collections may be seen of the bones of these ancestral horses, some being no larger than foxes.

The first horse was the *cohippus*, with four front toes and a splint. Then followed the *orohippus*; then the *mesohippus*, with three toes and a splint; and, in the upper miocene time the *mihippus*, with three front toes. After these came the *protohippus*, with feet having one large and two small toes, to be followed in the upper pliocene by the *pliohippus*, in which there is but one big toe and two splints, as in the modern horse. The *hipparion* represented a similar form in Europe. Finally came



the horse of to-day (Fig. 87), in which the middle toe prevails, the others being represented by splints. The animal stands literally on the nail of its middle toe, now called a hoof (Fig. 82).



FIG. 87. — THE DOMESTIC HORSE.

The mouth of the horse (Fig. 88) seems especially adapted to hold a bit, there being a vacant space between the front and back teeth, where this appliance for guiding the horse rests.

Of all animals the horse is the most valuable to man. It originated in the Old World and is not known in a wild state, except where mustangs or other horses have been lost, as in some of the western states, and on the eastern

shores of Maryland. Ponies are merely dwarf horses produced in cold countries, as Shetland.

Very tropical countries are not favorable to the production of the largest

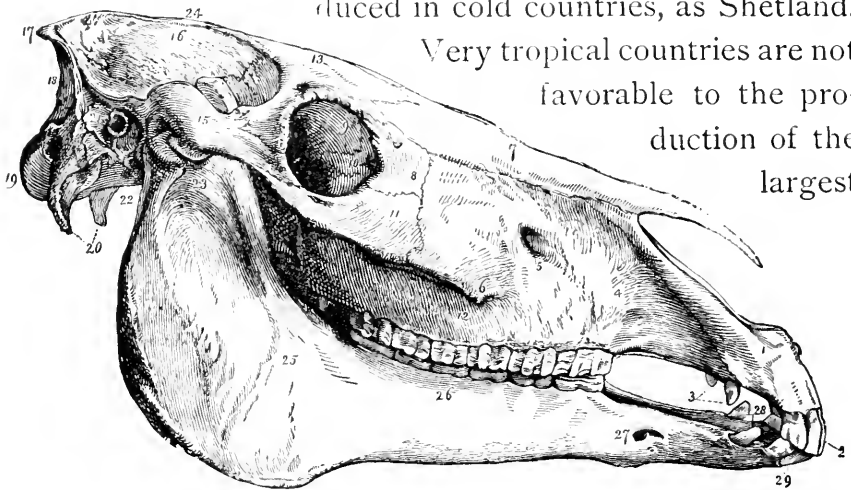


FIG. 88.—SKULL OF THE HORSE.

1, premaxillary bone; 2, upper incisors; 3, upper canines; 4, superior maxillary; 5, infraorbital foramen; 6, superior maxillary spine; 7, nasal bones; 8, lachrymal; 9, orbital cavity; 10, lachrymal fossa; 11, malar; 12, upper molars; 13, frontal; 15, zygomatic arch; 16, parietal; 17, occipital protuberance; 18, occipital crest; 19, occipital condyles; 20, styloid processes; 21, petrous bone; 22, basilar process; 23, condyle of inferior maxillary; 24, parietal crest; 25, inferior maxillary; 26, lower molars; 27, anterior maxillary foramen; 28, lower canines; 29, lower incisors.

and best horses, these being found in the temperate zones.

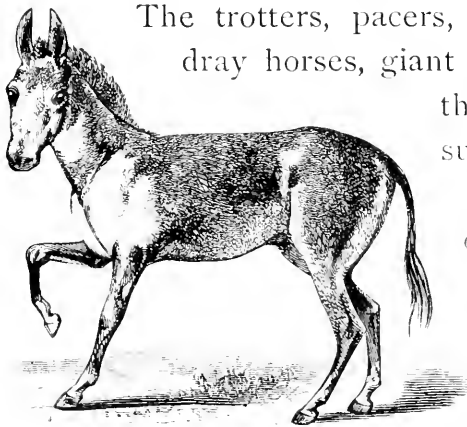


FIG. 89.—THE WILD ASS.

The trotters, pacers, running horses, common dray horses, giant shire horses, are all from

the same stock, being the result of selection or breeding.

The well-broken horse conveys no idea of the spirited animal of the plains.

In the West, especially in Central California, horses have been lost from time to time, and

wild herds gradually formed. Each herd is usually led by a beautiful stallion, full of fire and spirit, that acts always as its sentinel and guardian.

The wild ass (Fig. 89) is an interesting and valuable animal in the East, its tame representatives being inval-

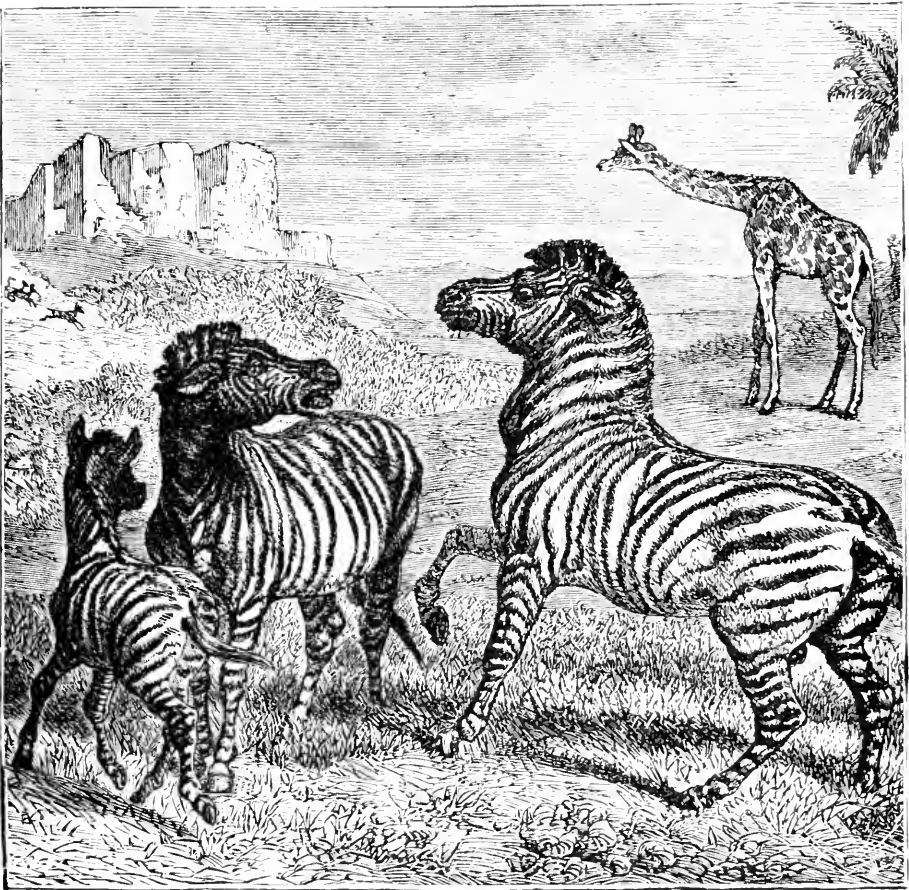


FIG. 90. — ZEBRAS AND YOUNG.

able beasts of burden, a type of all that is patient and enduring. One of the most beautiful of the wild horse-like animals is the zebra (Fig. 90), that runs in herds in Africa and Asia and is very difficult to tame. It is prac-

tically useless for domestic purposes. There are a number of species, all striking in their black and white marking.

One of the largest of African mammals is the hippopotamus, two species being known (Fig. 91). They inhabit the great rivers, being thoroughly aquatic in their habits, though nature has not especially adapted them to such a life. They are of enormous bulk; and although

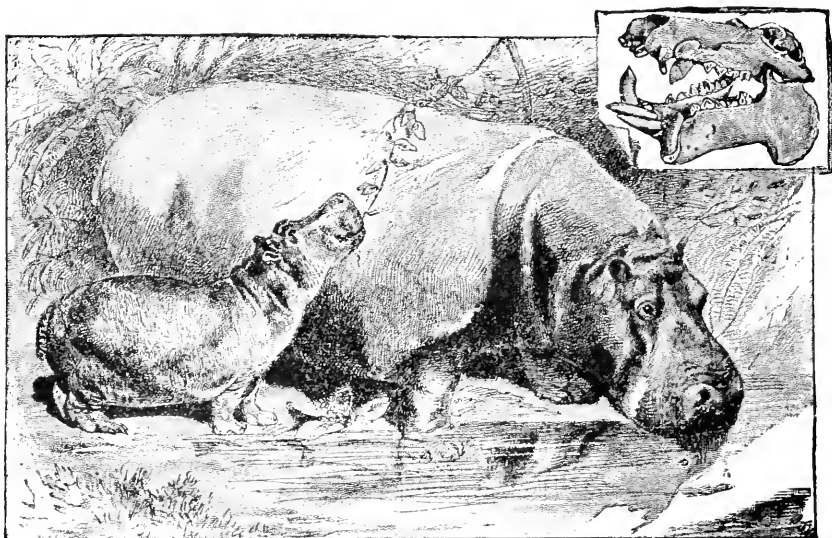


FIG. 91. — HIPPOPOTAMUS AND YOUNG.

they have huge, tusklike teeth, yet they live upon grasses and roots. In the rivers of their choice they are most active at night. During the day they can be seen with their backs or heads just at the surface, often bearing the young, that appear to be walking on the water. When attacked they become savage foes and have been known to crush a boat in their powerful jaws as easily as paper. A large specimen I observed in confinement invariably opened its enormous mouth when approached, — a mute method of begging for food, that was irresistible.

The pigs (Fig. 92) are among what are termed the even-toed ungulates, having four sharp-hoofed toes upon each foot. The head is long and pointed, and adapted to lifting the ground by rooting. The ancestor of all swine was the wild boar, a ferocious animal still found in many places, especially in Africa. In some civilized countries



FIG. 92.—THE WILD HOG.

pigs escape and run wild, soon reverting to their original estate. Pig sticking is a famous sport in India, the hunters following the wild boar on horseback with spears.

One of the most singular of the tribe is babirusa (Fig. 93), found in the islands of the Indian Archipelago. Its canine teeth grow to an enormous size. In one instance which I observed they had turned and grown into the skull, and doubtless in time would have destroyed the animal. The teeth of the ordinary pig show no abnormal

growth. The masked hog of Africa is a hideous creature, while the wart hog appears to have challenged nature to produce the most disagreeable of all animals.

Among the small members of the family are the peccaries (Fig. 94), several species being found in South America and Central America and even in Texas.

They travel in bands or herds, and few animals exhibit so

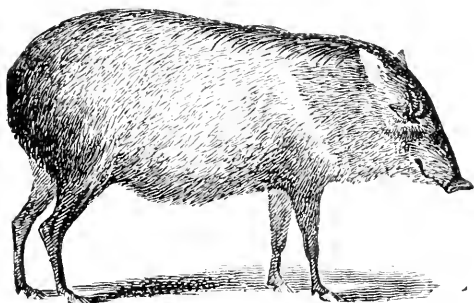


FIG. 94.—THE PECCARY.

much actual ferocity as these diminutive creatures. They will follow hunters, and have used their teeth so effectively that people have been fatally injured by them. In killing snakes the peccary will leap into the air and bring all of its sharp hoofs down upon the reptile, cutting it in pieces.

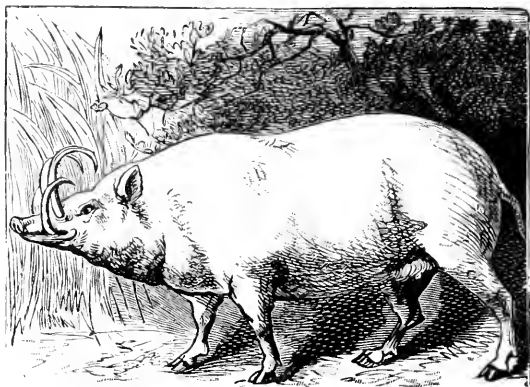


FIG. 93.—BABIRUSA.

## XII. THE EXTINCTION OF ANIMALS

To readers of American history it seems hardly credible that in the few centuries since the Pilgrims landed in New England entire races have almost been wiped out of existence. The Pilgrims found the country in the hands of native Americans who had lived here, and their ancestors before them, so long that there is not the slightest legend to point to a date when the American continent was not inhabited; but the Indians melted away before the whites, the fittest survived, and what was really a war of extermination was carried on.

When the whites first attempted to clear the forests and establish themselves, the bison or buffalo was common where the city of Washington now stands, and vast herds roamed many of the adjacent States — one of the most remarkable collections of animals, in all probability, in the known world. In the Middle West the herds were of such size that they at times stopped the cars on the first trans-continental lines, and when in motion, or demoralized, became a menace to life of all kinds. It is difficult to estimate the number of these animals, but that there were millions is certain, and they had a wide, indeed remarkable, range from far north down into Texas and from the Rocky Mountains to the vicinity of Washington, and doubtless to the Atlantic in some places; indeed, in a general way they were scattered over the whole continent.

The bison were the mainstay of the natives, who ate the

meat and used the warm skins for tents and for many purposes; but as the country was settled up by the white people, the bison gradually disappeared and at the time of the building of the great railroads the end came, the bison being represented to-day by a few small herds.



FIG. 95.—THE BISON.

All the large Mammalia are threatened with extermination. At the present time there is a revival in all whaling industries, but it is merely the result of several years of inactivity, giving the whale an opportunity to increase. Now steam whalers are superseding the old-fashioned ships, and before another century rolls around the right whale will be so rare that whaling will be given up again; its doom is certain: so large, conspicuous, and valuable an animal cannot last very long, especially when several fleets of vessels are scouring the seas for it.

When the Spaniards first visited California in 1542 they found herds of elk and antelope everywhere along shore; now there is hardly an elk to be found on the coast, and



the antelopes have been driven off, killed and run down, until to-day they are extremely rare, while the elk is only saved from extinction by being herded in reserves. Those in the Southern Sierras are to be restocked with them and the animals protected.

When the Americans took possession of California, or came in great numbers to the coast, the grizzly bear was extremely common, and it was one of the sports to bait up the animals over night and lasso them. They have been killed off so completely that a grizzly is extremely rare in Southern California. In twenty years the author can recall but two having been killed, the huge animals having been driven to the most inaccessible regions, where they will in time be hunted down and exterminated except those in the Yellowstone and other national reserves.



FIG. 96. — THE GRIZZLY BEAR.

In England, Ireland, and other localities are found the remains of the so-called Irish elk, a magnificent creature that lived in the Post-tertiary time and doubtless was run down by the early man, suggesting the fate of all the big-horned animals of the country in later times. They fade away before the advance of the human hunter, who too often kills without regard to the future and to satisfy his own desires and wants.

The gigantic rhytina referred to elsewhere is an interesting illustration or example of the complete extinction of a mammal within the memory of man. The Russians found it in Alaska on the Bering Sea and killed it for food and for pleasure. The end soon came, and one of the most remarkable of all animals, a giant thirty feet long, has passed out of existence and is known only by a few skeletons and bones in the museums. Many other mammals will meet this fate; the fur seal will not outlive the twentieth century, while the great walrus, so valued for its tusks, will also become extinct.

Such will be the fate of the narwhal, the white whale, and the seals of Newfoundland coast that are followed by fleets of sealers who kill them by hundreds, just as the fishermen shot the great auk by the boatload and exterminated a bird that is now one of the rarest of curiosities, specimens being valued at hundreds of dollars, even an egg ranking with precious stones in value.

Twenty years ago the sea elephant was not uncommon on the Lower California coast, but the sealers gradually killed it off, until the government was forced to send an expedition to obtain what was left that it might at least have specimens of skins and skeletons. In this way doubtless the last sea elephant on the west North American coast was destroyed. In 1850 a large herd of these fine animals that attained a length of twenty-five or thirty feet held sway at Santa Catalina Harbor — a fiord on the southwestern side of the island; they were killed off by Captain Scammon and his crew of whalers. The extinction of the South Pacific sea elephant is in progress at the present time, and a few years more and they will be but a memory,

represented by a few mounted specimens in the museums of the world.

The male sea elephant is a remarkable animal, attaining truly gigantic size. When aroused or infuriated, the nose becomes filled with air, swells up, and assumes something the appearance of an elephant's trunk, hence the name ;

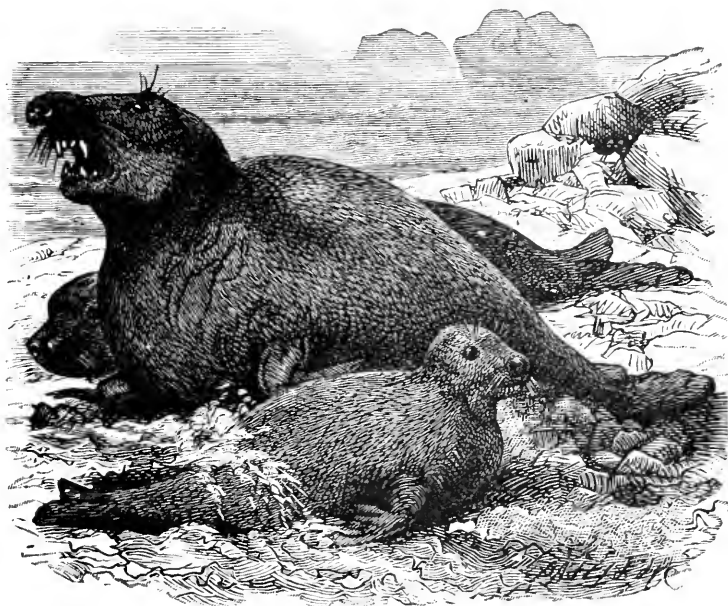


FIG. 97. — THE SEA ELEPHANT, MALE AND FEMALES.

but beyond this the resemblance is imaginary, as the trunk so called could not be used as the elephant uses its most pliable proboscis.

With the passing of these huge forms will come that of small seals of various kinds, many species being represented by a few animals, comparatively speaking. A case in question is the manatee. Within the memory of the author the manatee was not a rare animal in Florida, near Biscayne Bay and the Manatee River, and the Indians could capture

one at almost any time, the animal frequenting the mouths of the rivers; but man and the cold winds which have swept the country in recent years have almost wiped them out.

There are at the present time two specimens of these rare and valuable animals in the New York Aquarium, and there is good reason to believe that they are nearly extinct in North America, and doubtless very few are known on the islands or in South America. This is true of the dugong, a similar form found on the islands near Malay, where it was seen by early navigators who believed it to be a mermaid, and it is pictured as such in many of the old books. To-day it is being industriously killed by collectors who have placed a price on the dugong's head.

The places of last resort for great and notable mammals appears to be Africa and Asia, and for the past fifty years great inroads have been made on them. The tiger, a splendid cat, is systematically hunted in India, and killed wherever it is found. It is a menace to human life, but is, in all probability, holding its own. Were it not for the strong arm of the government the Indian elephant would long ago have been destroyed by the class of hunters who strike for large game and seem to think that he is the greatest sportsman who kills the most; this is not an American idea, at least among the real sportsmen of the country, who have an unwritten law that it is only permissible to kill what can be used in the camp, and that only savages kill merely for the sake of killing.

Africa is the most remarkable field for game in the world. It abounds in a great variety of antelopes alone,

which have been ruthlessly shot and butchered for years, and were it not for the vast supply they would have been killed off long ago ; as it is, regions which not many years ago knew them by thousands know them no more. The European governments which have gained control of different parts of Africa now charge a large fee for hunting privileges, and even then the big game is restricted. Even this will doubtless not save the African elephant



FIG. 98. — THE TIGER.

from extinction during the next century. The great value of the ivory, and the honor that is supposed to attend the killing of so stupendous a beast, are sure to have their effect. So long as the natives followed the elephant with their traps, and the Hamran Arabs with their swords, the elephant held its own ; but against magazine guns, express rifles with explosive bullets, this splendid animal has no chance.

Another giant doomed to extinction is the hippopotamus, that formerly was very common in nearly all the

rivers of tropical Africa; but the sportsman who kills for number is responsible for its gradual disappearance.

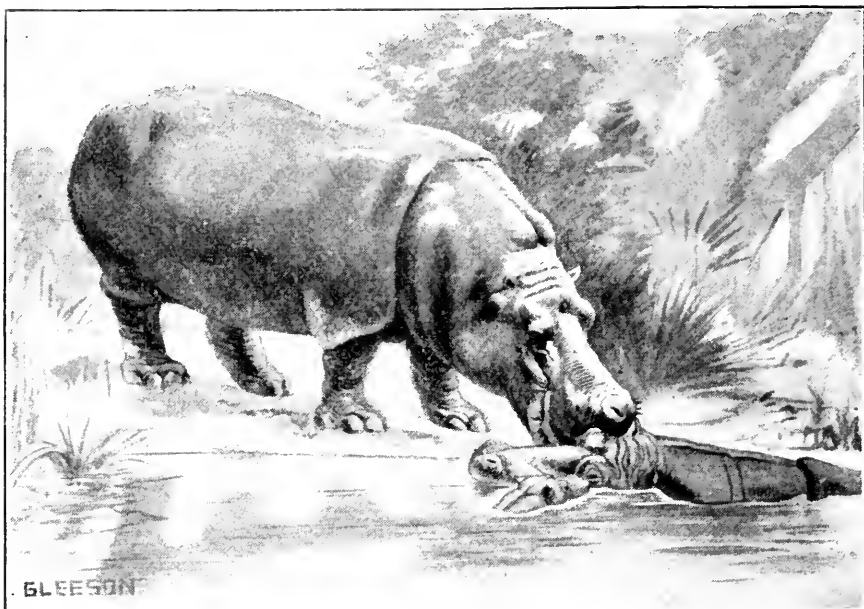


FIG. 99.—THE HIPPOPOTAMUS.

The gorilla has always been so rare that for years the stories told regarding it were considered myths. I recall spending an evening with Du Chaillu some years ago, when he referred pathetically to the fact that his experiences were not credited until other hunters had actually killed gorillas. Doubtless these animals are so very few in number that they will disappear during the present century, when Africa will have a railroad from Cairo to the Cape, and lateral branches in every direction. This will mean the opening up of the country to the whites; then will come the struggle for supremacy. Indeed, this has long been going on. The splendid game that a few years ago swarmed everywhere and is now found in great

numbers will be shot to sustain the inpouring throng. The natives will give way before the new order of things; civilization is fatal to many, — at least the type of civilization that has been applied to the American Indian, and the tragedy of the American Indian will be repeated; in fact, so far as the Zulus are concerned, it began long ago.

All Southern Africa long has been in the possession of the Dutch, English, and other nations, and the Zulus and other natives are pushed to the wall, and the wild game driven farther back. With this passing of wild Africa, hundreds of strange and interesting animals will disappear, — the African lion, the wild ostrich, the hippopotamus, the several species of rhinoceros, the gorilla, and the large antelopes.

Australia and New Zealand have many animals that

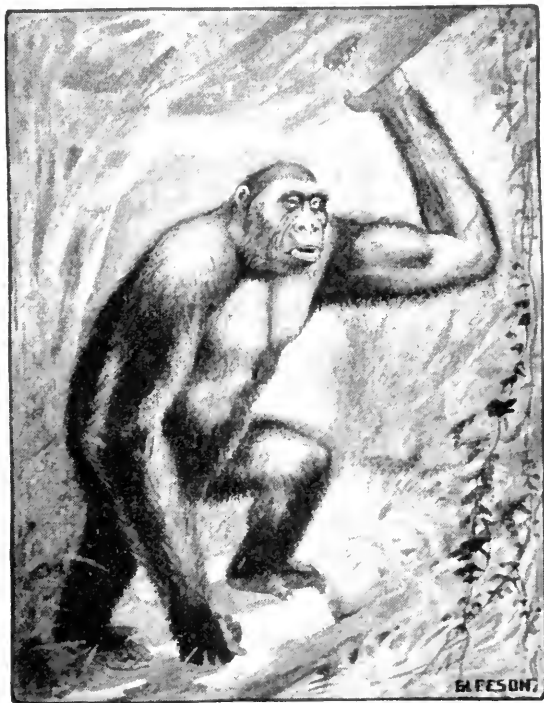


FIG. 100. — THE GORILLA.

are peculiar to that region, and these in the ordinary course of events may be swept away with the settling up of that country in the present century. These are the kangaroos and the other peculiar pouched animals found here. With-

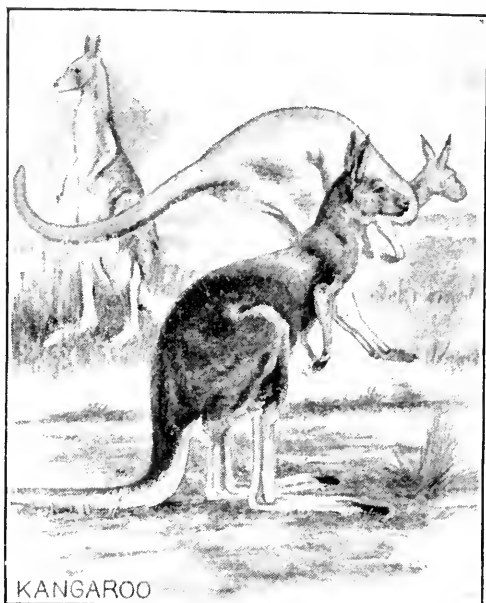


FIG. 101. — KANGAROOS.

in the memory of man, giant birds, the moas, lived in New Zealand; but they have passed away. Here is found the peculiar duck mole. This hedgehog-like animal is a milk giver; yet its young comes from a reptile-like egg. Already there is a price on every duck mole, and native hunters prowl about the bank of the rivers armed with long rods of

iron, which they thrust into the ground, testing it to find the burrows of the valuable duck mole, which they sell to collectors.

So extermination is going on all over the world. It seems to be a natural result of man's development and progress. But it can be arrested, and it should be the duty of all intelligent boys and girls to familiarize themselves with the conditions of animal life in the land in which they live, and to see that just laws are established to prevent the unnecessary destruction of animal life.

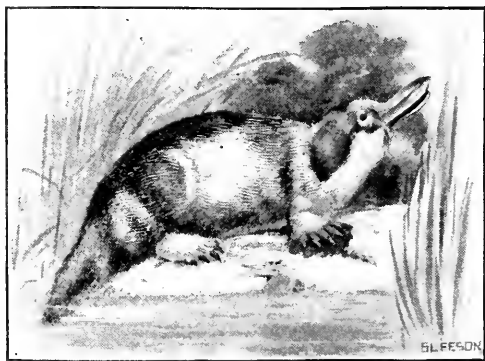


FIG. 102. — THE DUCK MOLE.



### XIII. THE ELEPHANT

When the Santa Fé Railroad extended its route from Los Angeles to San Diego, the laborers working near the town of San Juan Capistrano uncovered the skeleton of a huge elephant. I reached the place some days later and found that it was one of the great forms that roamed this country thousands of years ago. The peculiar situation of the skeleton told the story of the death of the animal. The bones were discovered on the side of a cliff about forty feet above the bed of a stream, lying in a light sand. When the elephant lived, the bed of the stream was forty feet higher, and the huge animal had, in wandering along, stepped into a quicksand, been mired or trapped, and so covered and held for thousands of years.

The elephants of yesterday were much larger than those of to-day. They were the mastodons and mammoths. Indeed, the milk givers seemed to culminate in the Quaternary age, the elephant, rhinoceros, ox, deer, and others being of gigantic size. Several species of mastodons (Fig. 103) at one time wandered all over this country, their huge teeth (Fig. 104) being frequently found in many states, and easily recognized by the marked depressions, those of the mammoth being flat, bearing some resemblance to the teeth of the African and Indian elephants. In size the mastodon was probably equal to two modern elephants, and the several species differed much, especially in their tusks, which were marvels of beauty and

symmetry. In some species they were straight columns of ivory turning up at the tips. Some had three tusks ; others had two in the upper jaw and one in the lower, the latter generally small though sometimes large and powerful. These tusks gave to the owner an armament unequaled among animals ; in fact, the mastodon must have

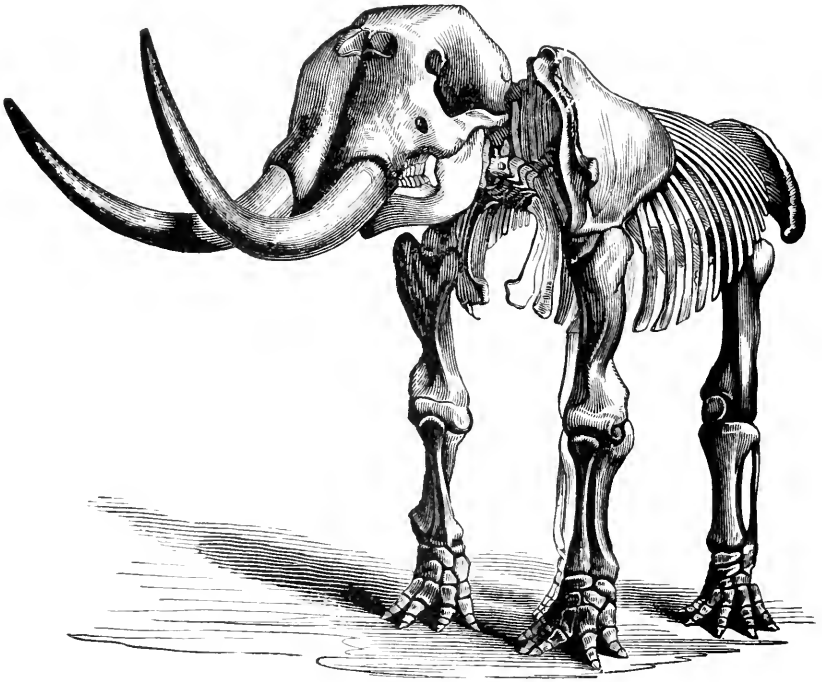


FIG. 103. — THE MASTODON.

been the terror of the ancient world. The Big Bone Lick of Kentucky has been a prolific source of discovery, and a splendid skeleton of the mastodon was found at Cohoes, New York, the skeleton being packed in a pothole, showing that the animal had been swept downstream and washed into the hole. This specimen, mounted in the New York State museum, is twenty feet in length.

Doubtless the mastodon roamed every continent. They lived in what is known as the Quaternary time, and probably were hunted by early man. Nine species are known from Europe alone, five from India, four from North America, two from South America, and two from England, while the discovery of a tooth in New South Wales shows that they undoubtedly ranged in the Australian continent. Teeth have also been found on Santa Rosa Island.

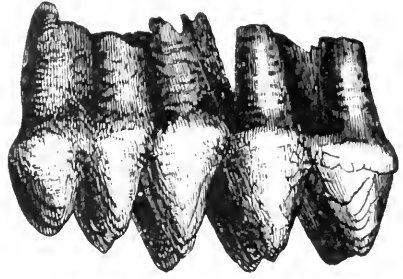


FIG. 104.—TOOTH OF MASTODON  
(*M. Americanus*).

In many of the old Chinese

legends there is found an account of a creature called tyn-schu, a huge, subterranean, ratlike animal, a monster provided with long, curved horns which plowed its way through the earth. When it moved through the solid rock, it shook the earth; hence the earthquake. Some inquisitive person attempted to follow up this legend to learn

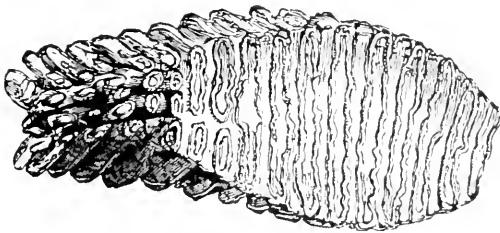


FIG. 105.—MOLAR TOOTH OF A MAMMOTH  
(*Elephas primigenius*), GRINDING SURFACE.

what basis of fact there was in it, and it was found that the discovery of the mammoth in all probability originated the picturesque story. As this greatest of elephants was

nearly always found buried in the earth, the Chinese or those from the North readily assumed that it had been killed while tunneling through the crust.

The mammoth, in a general way, resembled the African

elephant. With the mastodon and the elephant (*Elephas Americanus*, referred to as having been found near San Juan Capistrano, California), it roamed in Quaternary times in what is now the United States.

The mammoth was confined to the north. It affected colder regions than the others, and was probably as common there as the musk ox is at present. It was a huge, impressive beast, with colossal tusks thirteen or fourteen feet in length, curved in a remarkable manner upward and outward. Each of these tusks weighed several hundred pounds. As a protection from the cold, this king of all the elephants had a thick coat of hair, some of which can now be seen in the museum at St. Petersburg. The hair was of three kinds. First and next to the skin was a coat of reddish wool; over this was a layer of long, reddish hair; and upon the neck grew a thick, heavy mane.

Several specimens of the mammoth have been discovered in the frozen tundras of Siberia as well preserved as though the animal had died yesterday; and if appliances had been at hand a perfect mammoth, perhaps millions of years old, could have been secured. The discoveries have all been sensational and have created great interest. One of the first was found by a poor fisherman in the mouth of the River Lena, in Siberia. He first saw the huge tusks protruding from the ice and frozen earth. When he returned southward in winter he told the story, but was not believed. Perhaps the discoverer and others thought it but another tyn-schu killed in its burrow. In the following spring Schumarhoff visited it again and found it more exposed, and again told the story. The third year he found that it had rolled out upon the sand,

and that the wolves and bears were eating the flesh, which had been frozen for untold ages and perfectly preserved. Upon the fifth visit he secured the tusks and brought them south. Seven years after this a Mr. Adams visited the spot and secured the long mane, much of the wool, and one of the eyes, which is now in St. Petersburg and in nearly as good condition as though taken from a freshly killed elephant.

Several skeletons have been found in England, also in France; but the great burying ground of these monsters was upon the borders of the Arctic Ocean. So many have been found on the New Siberian Islands that their collection for years has constituted an important and productive business. One of the most interesting finds was made by a Russian engineer named Benkendorf, in 1846. The spring of that year was very warm, and the thaw washed out new channels on the Indigirka and carried away banks that had stood for ages. While rowing up one of these new channels he discovered a mammoth just washed out of a frozen tundra. He says: "A black, horrible, giant-like mass was thrust out of the water, and we beheld a colossal elephant's head armed with mighty tusks, with its long trunk moving in the water in an unearthly manner." The men immediately seized the mammoth and fastened it to the shore with chains and ropes, and for several days examined it. "Picture to yourself," says the finder, "an elephant with a body covered with thick fur, about thirteen feet in height and fifteen in length, with tusks eight feet long, thick and curved outward at the ends, a stout trunk of six feet in length, colossal limbs of one and a half feet in thickness, and a tail naked up to the end, which was

covered with thick, tufty hair. The animal was fat and well grown. Death had overtaken it in the fullness of its powers. Its parchmentlike, large, naked ears lay fearfully turned up over the head. About the shoulders and the back it had stiff hair about a foot in length, like a mane. The long outer hair was deep brown and coarsely rooted. The top of the head looked so wild and so permeated with pitch that it resembled the bark of an old oak tree. The whole appearance of the animal was fearfully strange and wild." From the perfectly preserved contents of the stomach, young shoots of fir and pine, they could tell exactly what had constituted the last meal of the mammoth, so that almost its complete history could be worked out. The men had secured the tusks and were at work on the skin when a flood came and literally tore the body from them and carried it away.

The fate of this and other mammoths it is not difficult to determine. This one had been "bogged" in a morass, and its enormous weight had been the means of its death. It had gradually sunk until out of sight, and then had been frozen, to remain for centuries, or until the freshet washed out the old morass. In America three or four skeletons of mastodons have been found together, all standing upright, showing that a small herd had ventured into a quicksand or a bottomless mud deposit, and their combined weight had carried them down. We can imagine their trumpeting and their fierce struggles to escape from the trap into which they may have been driven by human enemies.

Such were the elephants of yesterday. Those of to-day are still the largest of all land animals. There are two

well-known species. The African elephant (Fig. 106) is the largest, and ranges equatorial Africa. They attain a

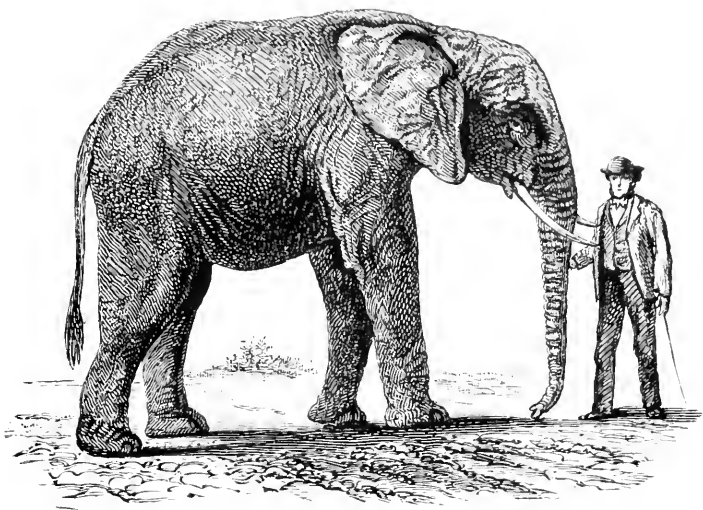


FIG. 106.—THE AFRICAN ELEPHANT.

weight of three tons, and have a long proboscis which serves as a fifth limb, an arm or hand, performing work of all kinds. It is really a prolongation of the nose and upper lip. It is hollow (Fig. 107), six or eight feet in length, and made up of forty thousand muscles so arranged as to afford it the greatest possible motion. At the extremity of the trunk are two orifices, the openings of the nostrils, and it ends in a fingerlike tip endowed with an exquisite sense of touch. With this trunk the elephant pulls down

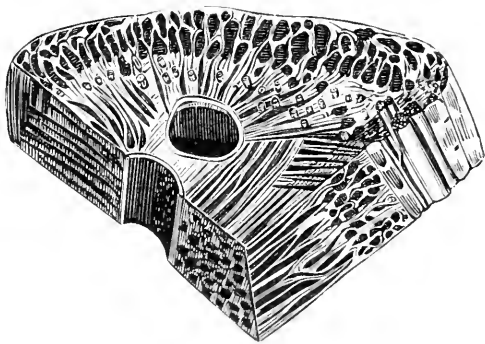


FIG. 107.—SECTION OF TRUNK.

branches, lifts the smallest objects, blows dust over itself, sucks up water; in fact, performs all the work that could be expected of a pair of lusty arms.

The jaws (Fig. 108) are ponderous objects. The upper incisor teeth are tusks, the weapons of the elephant. The lower jaw bears two molars of large size, ridged

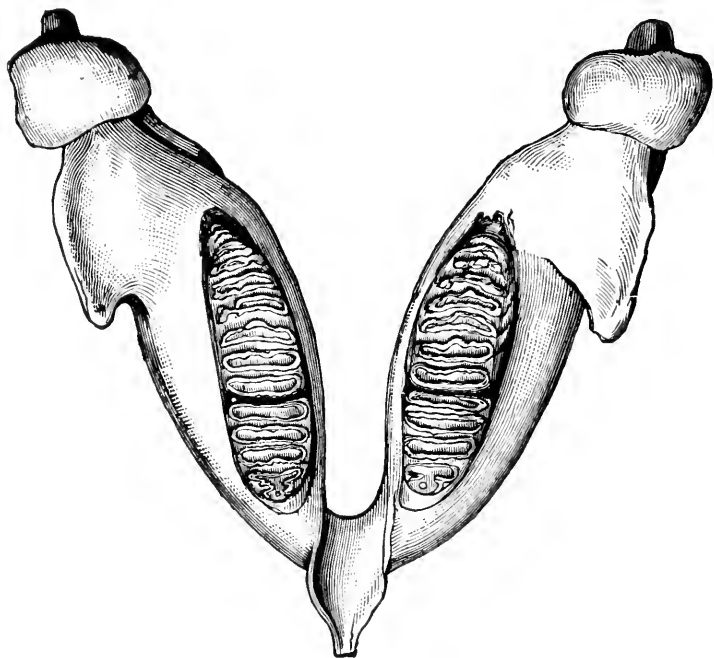


FIG. 108.—THE JAWS AND TEETH OF AN ELEPHANT.

transversely and filled with cement or *crusta petrosa*. The skeleton of the elephant (Fig. 109) is massive and ponderous, yet it is a very active animal for so large a one. The tusks are of ivory, one of the most beautiful of all the objects derived from animals and long used in the arts. It is said that the people of India built ivory palaces. In the "Odyssey" we read,

"The spoils of elephants the roofs inlay."



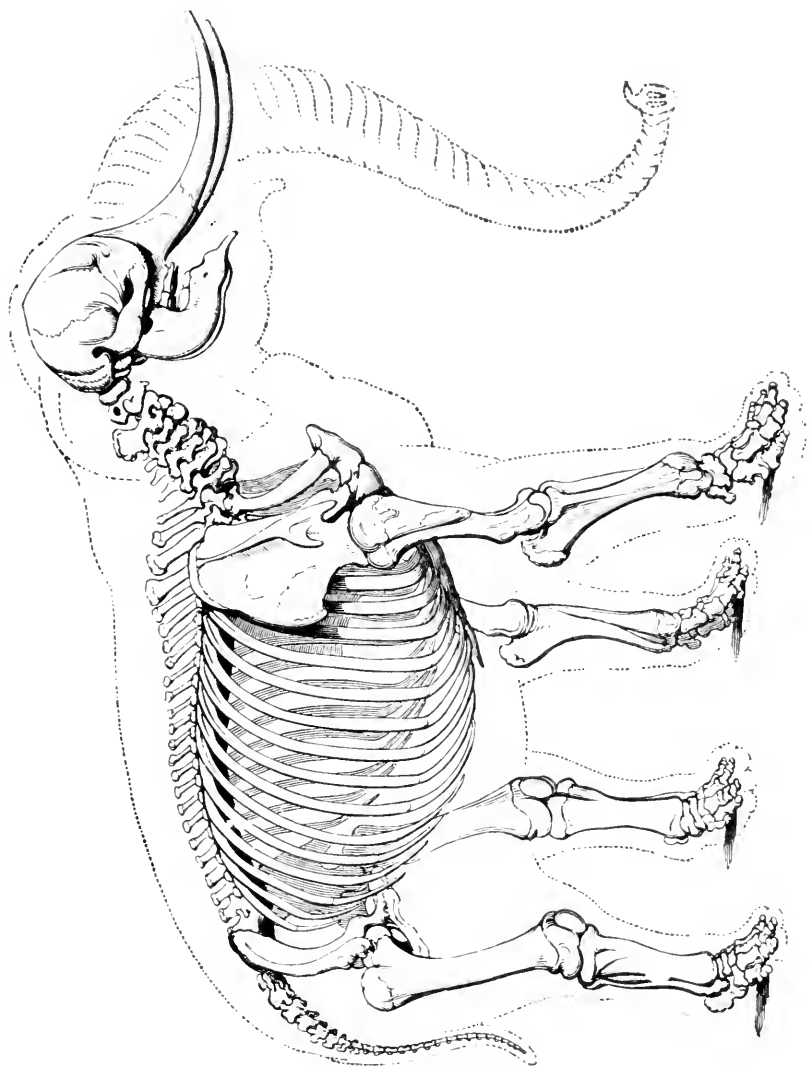


FIG. 109. — SKELETON OF AN ELEPHANT.

To supply the demand of the world for ivory (eight hundred tons per annum), over seventy-five thousand elephants are killed, which means the extinction of the animal in the near future. So rapidly has the African elephant been killed, that the various powers have agreed to protect it, and sportsmen now pay a heavy fee, or fine, for killing one of these animals.

Every tusk brought out of Africa is at the expense of one or more human lives. Fifty-one thousand elephants are annually killed on the west coast of Africa, and twenty-five thousand in other parts. Tusks range in weight up to one hundred and fifty pounds each. The ivory cross of the high-altar at the cathedral at Goa weighs one hundred and eighty pounds and is straight. A native king in Africa had a pair of tusks which were eight feet long and measured two and a half feet at the base. They weighed two hundred pounds each. In Amsterdam a tusk was sold some years ago which weighed three hundred and fifty pounds. The tusks often take strange shapes. An elephant was killed in 1856 and seen by Thomas Barnes, F.R.S., which had nine tusks; five on the right side, and four on the left. The tusks in the African elephant are much the largest, and they occur in both sexes, while in the Asiatic form the male alone possesses them. The African elephant is at least a foot taller than the other, being about eleven feet high. Its ears are enormous and distinguish it at once, covering the shoulders and measuring three and one half feet in width.

In Africa the elephant is found in the warm regions, feeding on herbage of its choice. A single young is born at a birth, weighing about one hundred and seventy-five

pounds and standing two feet ten inches. In eleven months such a baby will gain seven hundred pounds. The proboscis of the infant elephant is at first twelve inches in length.

The Asiatic elephant is smaller than the African. The ears are not so conspicuous and the tusks are much smaller, yet the animal is much more valuable as a



FIG. 110. — ECONOMIC VALUE OF THE ELEPHANT.

worker. Indeed, the African elephant has never been of any domestic use to man, owing to its uncertain temper, while the Indian elephant (Fig. 110) is employed in various ways. The government maintains large herds which display the most remarkable intelligence, performing labor that requires the most exact obedience. In the lumber yard they may be seen handling big logs with great dexterity. In the great pageants of the East the

elephant has always been a conspicuous feature, and the kings and emperors of old maintained armies of hundreds of elephants which they equipped in the most gorgeous fashion. In times of war the tusks were fitted with daggers of steel or iron and the bodies protected with armor of leather and iron. In Siam the white elephant is held in reverence by some. It finds a place upon the flag, and the animals are kept with the greatest care. These elephants are merely albinos and are pink or splashed with pink, the term "white" conveying a very erroneous impression. Pygmy elephants existed in former times. One from Malta was three feet high, and its young must have been about the size of a cat. Dwarf elephants are occasionally seen to-day.

## XIV. THE DEER

There is no more perfect picture of contentment than a cow lying in the high grass on a warm day “chewing her cud.” As we watch her, she chews and chews, finally swallowing. Then with a convulsive movement something comes up into the throat, and she begins to chew again with eyes half closed, the embodiment of comfort and happiness. This act gives to the cow, deer, goats, sheep, and others the name Ruminants, because they chew their food twice. To understand the operation thoroughly,

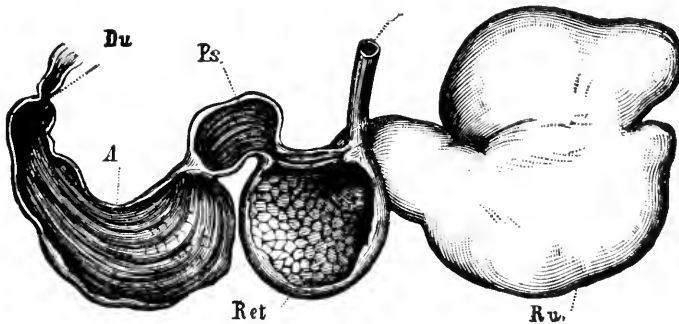


FIG. III.—STOMACH OF A RUMINANT (SHEEP).

E, esophagus; Ru, paunch; Ret, honeycomb; Ps, manyplies; A true digestive stomach or rennet; Du, beginning of intestine.

some idea of the stomach of a ruminant (Fig. III) should be gained. There appear to be four compartments in it. The grass is bitten or pulled off, and swallowed at first without much preparation. It passes through the esophagus, being large and poorly prepared, and enters the paunch, or stomach number one. There it is mixed with water,

and is passed on to stomach number two (*Ret*), where there are honeycomblike spaces which form it into balls or cuds. From here, by a simultaneous contraction of the diaphragm and abdominal muscles, this molded cud is forced up into the mouth again, where it is chewed very fine while the animal is resting. Finally it is again swallowed, and being soft, it has not sufficient bulk to press open the slit and drop into the first stomach, but passes along over it to the third stomach, or manyplies (*Ps*), and so reaches the true digestive organ (*A*).

The deer are among the most attractive of all animals — graceful, timid, delicate of limb, with soft eyes and dainty colors. They well adorn the leafy coverts which they affect in all lands. The male deer is larger and has fine branching horns, or antlers, which attain their full perfection and are cast yearly. The finest example of these animals is the American elk, or wapiti, closely allied to the famous red stag of England. It stands over five feet at the shoulders, and is eight feet long and of commanding presence. The fully developed male has a veritable crown in its spreading horns, the tips or points of which increase with age. As many as forty-five of these points have been counted on the English stag.

The wapiti is a valiant foe when antlered, but it is helpless when it loses its antlers. Some sections of the country, in Idaho, Wyoming, and other regions, seem to be casting grounds, so plentiful are the antlers lying about. In one Western town they have been collected by hundreds and a fence made of them near the station. Bereft of its horns, the stag is very defenseless. Near the end of spring there is an increased flow of blood to the head, the

veins are greatly enlarged, and budding new horns soon appear. They are soft, very sensitive and delicate, and are covered with seeming velvet. They grow so rapidly that in a little over two months the antlers are perfectly formed, and a burr or rim forms at the ball, cutting off the

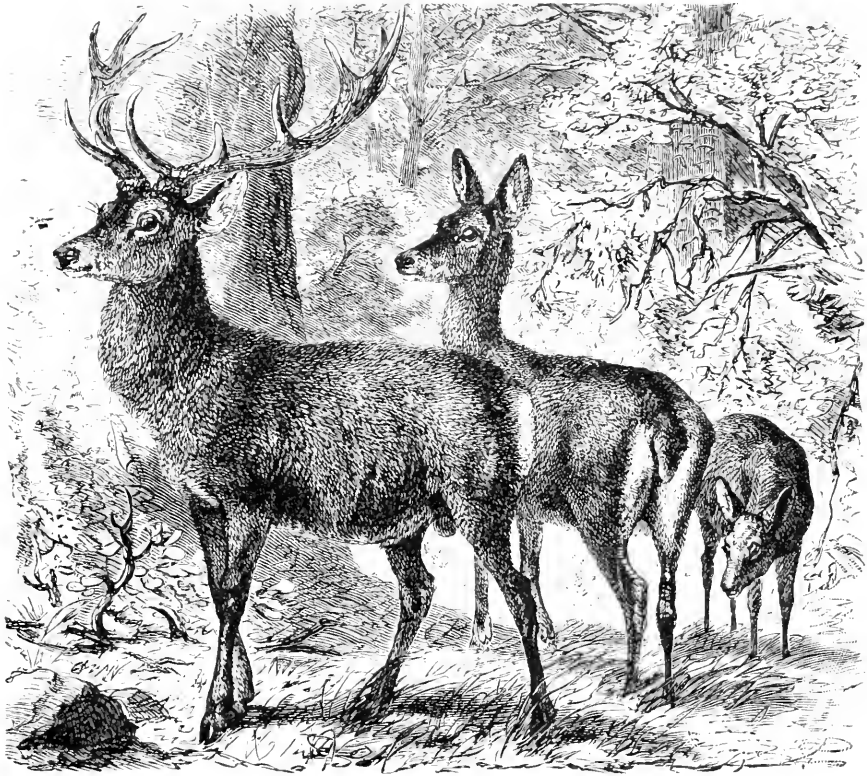


FIG. 112.—THE WAPITI.

blood vessels, which in a short time disappear, leaving nothing but grooves to tell the story. The delicate velvet also dries and is worn off, and the stags now appear anxious to test their newborn antlers.

A group consisting of the male, female, and young wapiti (Fig. 112) is a picture long to be remembered.

Not many years ago this splendid animal had a wide range over the middle and western country, but poor laws, insatiate hunters, and various other causes are rapidly causing its extinction. To-day there are small herds in California and some large ones in the region of the Yellowstone Park; but even there, where they are supposed to be protected, thousands have frozen or starved in the cold winters of the past five years, and another quarter of a century doubtless will see the last of the noblest of the deer family. Many are hunted by poachers



FIG. 113.—VIRGINIA DEER.

in the winter, the stags being followed down into canyons by men on skis or snowshoes and easily roped or killed.

The Virginia deer (Fig. 113) is smaller than the wapiti, but more beautiful. It ranges the eastern United States and is holding its own.

The young are dainty, spotted creatures, easily tamed or domesticated. The stags are very courageous and indulge in terrible combats, sometimes succeeding in locking their horns—a dilemma which results in the death of one or both. Deer are still common even in the well-populated East. I have often seen them in the Adirondacks and Virginia, where deer hunting is one of the popular sports. In some regions where they are protected they have become a nuisance and a menace to the farmer.

The roebuck is a small English deer of graceful form, fleet, and cunning in avoiding the hunter. In the fine



English parks is found the fallow deer (Fig. 114), a tawny brown, domesticated animal that lends beauty to these ancient holdings.

The reindeer of the Arctic regions (Fig. 115) is one of the most valuable forms, especially in Lapland, where it

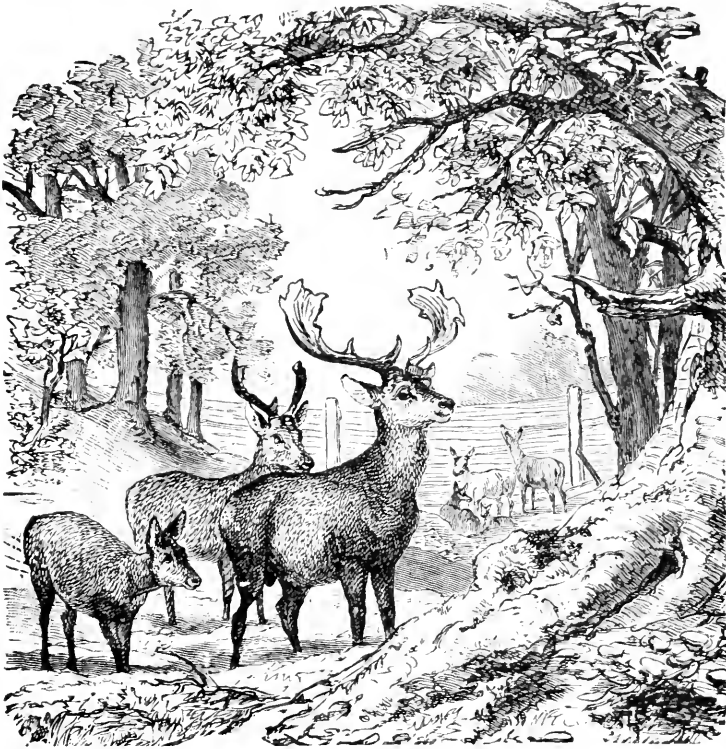


FIG. 114. — THE ROEBUCK

takes the place of the horse. If it were not for these animals, the life of man in the far North doubtless would be still more precarious. The United States government some years ago purchased a large number of reindeer and carried them to Alaska for the natives. They require but little care, living almost entirely on moss, to obtain which in winter they dig into the deep snow, using their singular

spreading hoofs (Fig. 116) for the purpose. In Lapland the wealth of a Laplander is estimated not by dollars, but



FIG. 115.—THE REINDEER.

by his reindeer, these animals being the standard of values. They provide milk, their skins are made into leather, and

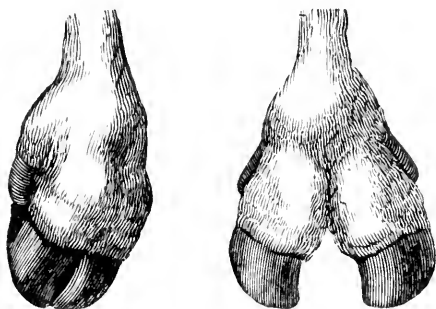


FIG. 116.—FEET OF THE REINDEER.

their horns are used as handles for various implements. They are so fleet of foot that they easily travel from fifty to seventy-five miles a day. In India the rich rajas assemble with their herds of elephants; and in Lap-

land a millionaire is he who possesses one thousand or more reindeer. In Kamschatka the reindeer is saddled

and ridden as a horse, and the Tunguses use it as a pack animal, traveling with long trains loaded down with produce. The Koreki have herds of forty or fifty thousand. The reindeer is milked by the Lapps, but submits very ungraciously, often having to be tied head and feet. Even then it butts the women over and drags them about.

The moose (Fig. 117), a fine large deer, is found in North America, Europe, and Asia. The most available region in which to observe it is the northern part of Maine, where large

specimens are taken yearly. The moose is an animal of remarkable appearance. Its enormous head and rounded muzzle, its huge flat horns,



FIG. 117. — THE MOOSE.

its humped back, and sloping body give it a personality not easily forgotten when seen in the open or dashing across country at a swinging trot.

The moose is the giant of the deer family; its horns alone weigh eighty pounds, and call to mind the pine branches of the forests of its choice. It stands very high, with long, muscular legs, so that it easily steps over a five-foot wall. The horns are cast in December and appear in April, attaining their full size in June. When the "velvet" first peels off, they are a vivid white, and the huge creature presents a weird and remarkable appear-

ance. In America the moose is followed over the snow on snowshoes and is a most difficult animal to approach, being very timid, rushing off at the slightest alarm. In some parts of northern Europe it is sometimes hunted on horseback.

The smallest deer is the little kanchil of Borneo, Java, and Malacca, which is hardly as large as a small dog, and whose young at birth are the size of rats. It has singular canine tusks.

The axis deer of India is one of the most attractive forms, spotted with white after the fashion of many young.

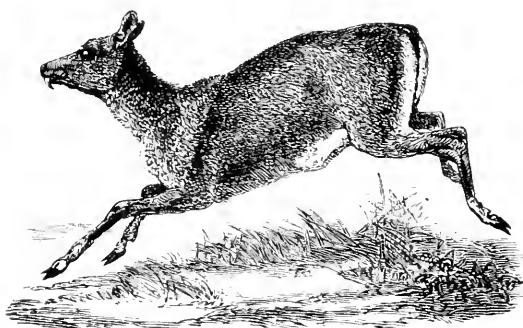


FIG. 118. — MUSK DEER.

The musk deer (Fig. 118) of Thibet is an interesting little creature with tusklike canines in the male which are used as weapons, neither sex possessing horns. The musk of commerce comes from a

peculiar gland in the stomach, containing about an ounce of musk, so penetrating, when the animal is shot, as almost to overpower the hunter. The collection of this musk is an important business in Indo-China. The little animal is very shy and is caught only in traps, to which the Tunguses attract it by imitating the bleating of the pygmy young.

In western North America there are several interesting deer, among which are the white and the black tail and the mule deer. The black tail is a small, beautifully

shaped creature which I have taken in the Sierra Madre, where it affects the thickest brush and is difficult to reach. Several were placed upon the island of Santa Catalina, where they became so tame that it was impossible to keep them away from gardens. Then they were decorated with cow bells and placed on the north ranch or end of the island and were so tame that when a boat landed they would run down to the beach to meet it. The mule deer, so called from its long ears, is a large, clumsy form common in the northwest and in Southern California and Arizona. Several other interesting deer are found in Central and South America and in various parts of the world, but none equal in size and beauty the wapiti and its British cousin.

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## XV. GOATS AND SHEEP

The ruminants, or cud chewers, it will be observed, differ greatly in their horns. Those previously referred to cast them at regular intervals, and with the general exception of the reindeer the males alone possess these weapons. There are many others, as the goats, sheep, oxen, buffaloes, and antelopes, in which horns are permanent, with one exception never being cast, and are in the main hollow.

The goats and sheep are peculiarly valuable to man, the wool of sheep alone being one of the most valuable of all commodities. One hundred thousand lambskins, six hundred thousand astrakhan skins, and two million common sheepskins are used annually in trade, while millions of pounds of wool are used for cloth and garments of every kind. The cheapest and coarsest varieties are employed by the carpet weavers. The goats are quite as valuable, mohair and cashmere being made from them, and fifteen million pounds of Angora wool alone are used annually. The horns, hoofs, and other portions all possess a value to the manufacturer.

On the island of Santa Catalina are found the only large herds of the wild goats in America, several thousand running wild on the picturesque mountains of this isle of perpetual summer. They differ but little from the ordinary goat, but have attained a greater growth of hair. They were placed there about fifty years ago and have become so wild that they afford excellent sport.

The mountain goat (Fig. 119) is found in the inaccessible mountains of the Northwest. It is pure white, the horns being short and jet-black. It is very shy, and the hunter who obtains it may well be congratulated. Many attempts have been made to bring it to civilization, almost all failing. In one instance the hunters caught the kids by running them down and started out of the mountains with prepared milk in bottles to feed them; but the little animals soon died. In the



FIG. 119.—THE MOUNTAIN GOAT.

next attempt, a tame goat will be taken in and the little ones transferred to her, and if this succeeds, they will be brought out with their adopted mother. The mountain goat is about the size of an ordinary sheep, but has a decided hump upon its withers.

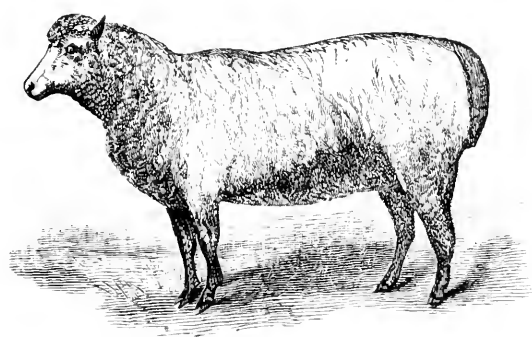


FIG. 120.—SHEEP.

Over forty-five varieties of the common sheep (Fig. 120) have been noticed, some so singular that there appears to be very little resemblance between them. The maned sheep of the Atlas Mountains is a fine animal, seemingly possessing characteristics of both sheep and goat. It bears a close resemblance to our splendid

American form, the big-horned sheep (Fig. 121). The latter is a large, powerful animal with splendid horns, which ranges the mountains of western North America. The horns in the female resemble those of a goat, but those of the males are enormous, veritable battering-rams, which



FIG. 121. — BIG-HORNED SHEEP.

they use to good purpose. I have seen several specimens taken within forty miles of Los Angeles, but the animals are now rare, even in the solitudes about Mount San Antonio, where these specimens were captured. They are still common in small herds in the mountains of Lower California.

Of the many foreign goatlike forms the ibex (Fig. 122) is the best known, a noble European species having remarkable horns with longitudinal ridges. The Alpine ibex is about three feet high at the shoulder and weighs two hundred pounds. It is a very conspicuous and commanding animal, highly regarded as game by sportsmen, who penetrate the higher ranges of the Pyrenees and other ranges to capture it.

The curious musk ox (Fig. 123) is closely allied to the sheep and is confined to the Polar regions, where it has often served as a forlorn hope for starving explorers. In former years it was a common animal over Siberia, Ger-



many, France, and England, but it now has a very restricted range. The horns are large at the base, bend down, and curve upward. The entire animal is covered with a coat of long hair and wool, which being amber colored, gives



FIG. 122. — THE IBEX.

the animal a very singular appearance. When met in the white snow, it is well calculated to startle the novice in this sport. The odor of its musk is very strong. It runs in herds of from ten to twenty, and, when feeding, sentinels are stationed about, which warn the others by stampeding. Its cry is unlike that of any other ruminant, being



FIG. 123. — THE MUSK OX.

a “whine.” The musk ox is doomed to extinction, though the last Peary expedition reports seeing large numbers. It is mostly confined to the regions around the Great Bear and Great Slave lakes and along the upper tributaries of the Mackenzie River. As food the animal is very valuable to the dwellers of the far North. In its best condition an ox will weigh four hundred and fifty pounds, the flesh, when the animal is fat, resembling venison.

## XVI. THE ANTELOPES

The antelopes are the types of grace, speed, and beauty. They find their finest expression in Central Africa, where scores of rare and shapely antelopes make the country a paradise for the hunter. The pronghorn is the only representative in America, an attractive creature fast disappearing before the advance of civilization. This antelope receives its name from the singular prong midway up the curved horn (Fig. 124). We find in it the only instance in which the animals of this class cast their horns, the latter being dropped every October or November. The horns are from eight to ten inches in length.

The little animal is larger than a sheep, standing about two feet six inches at the withers. Its coat is brownish and white, the buttocks pure white. The eyes are large and expressive, and in the males are placed directly beneath the base of the horns. The antelope now ranges from the Missouri River to the Pacific, but is being restricted year by year, and very few are now to be found in California, though a small band makes its home on the western Mojave. They are very inquisitive, and sportsmen approach them by making strange motions, when the little animals will sometimes run directly for them. When chased they often run in a circle and lead horse and rider a most difficult chase. The country frequented by the antelope also abounds in rattlesnakes, which the antelope



FIG. 124. — THE PRONGHORN.

kills by leaping into the air and coming down upon it with its sharp hoofs.

Quite as graceful and even more difficult to capture is the chamois, a mountain-loving antelope with small vertical horns. It is about two feet six inches in height at

the shoulder. It is still found in Switzerland in the high Alps, but is more common in Austria. Few antelopes are so rapid in their movements or so sure of foot. The stories told by Alpine hunters of its climbing powers are very remarkable. No spot seems too inaccessible for them, and when in danger they do not hesitate to leap down high cliffs.



FIG. 125. — THE KUDU.

Africa is the home of the antelope. The kudu (Fig. 125) is one of the largest, and possesses the most beautiful horns of any antelope in the Kaffir country. In Zululand it is famous game. The males have fine horns, spiral, often four feet in length and two feet apart at the point, highly valued as trophies. Almost as striking in appearance is the oryx (Fig. 126) of Africa, the gemsbok of the Dutch. The



FIG. 126. — THE ORYX.

horns are long, slender, and beautiful. They are but slightly curved, being so straight, in fact, that they are often used as canes.

The gazelle (Fig. 127) is a type of beauty and speed. Indeed, all these antelopes are famous for their activity,



FIG. 127.—THE GAZELLE.

it being almost impossible to catch them. The gazelle is a desert-loving form. Its close allies number twenty-three or twenty-four species, found in different parts of the Dark Continent. This little creature is often chased with grey-

hounds. But it will tire the fleetest hound, its speed and its wonderful resemblance to the dry, sandy soil making it difficult game to capture. The antelopes are highly valued as game, and the natives use the skins as water jars.

Among the large and powerful antelopes are the gnus (Fig. 128), which are by no means so attractive as the previously mentioned forms. They appear more like horses with horns, and in fact a common name for them is the horned horse. They stand about four feet at the shoulder, and have a length of nine feet. Both sexes possess horns. With heavy manes, flowing, horselike tails, and fiercely whiskered faces, they are not the most attractive of animals. They run in herds of fifty, and are hunted by the

natives for their skins, which are valued for various purposes. When alarmed, they have a singular habit of wheeling in a circle several times before running. They are often seen with zebras and with other antelopes on the great plains of Zululand.

The most remarkable discovery of modern times was the finding by Sir Harry Johnston in the heart of Africa of an entirely new and remarkable antelopelike creature called the okapi (frontispiece). It is supposed to be related to the giraffe, and is allied to the fossil halladotherium. It differs from all other animals, except the giraffe, in having a very long space between the eyetooth and the first molar. The okapi is about a third the size of the giraffe. The hair is smooth like that of a horse, and in general appearance it bears a close resemblance to the eland; but it has

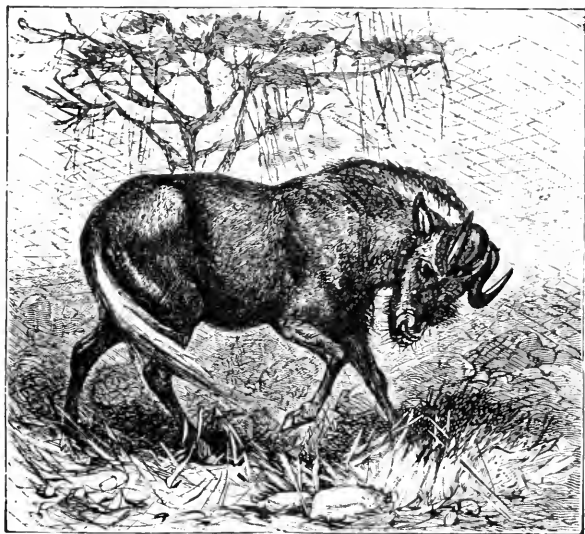


FIG. 128. — THE GNU.

on its hind quarters and fore legs stripes, calling to mind those of the zebra. The early Egyptians were familiar with it, according to Professor Wiedemann, who claims that the head of the god Set is a copy of that of the okapi.

The discoverer of the okapi also found in Uganda a new five-horned giraffe, the ordinary form having but two,

which are covered with flesh and hair. The giraffe, while a familiar animal, often seen in menageries, is one of the most remarkable and wonderful of all living animals. It is literally a huge antelopelike creature with a neck stretched out of all seeming proportion (Fig. 129), that it may browse upon the leaves of trees. The bones in the neck, however, do not number more than in other ruminants, each vertebra being lengthened out. So long is this singular neck that the giraffe can feed upon foliage nineteen feet from the ground. The tongue, being nearly seventeen inches in length, materially increases the reaching power of the animal. The back of the giraffe slopes rapidly down from the neck and gives the impression that the fore legs are the longest; but all are equal.

Tall and clumsy as is the giraffe, it is a difficult animal to capture and succeeds in at-

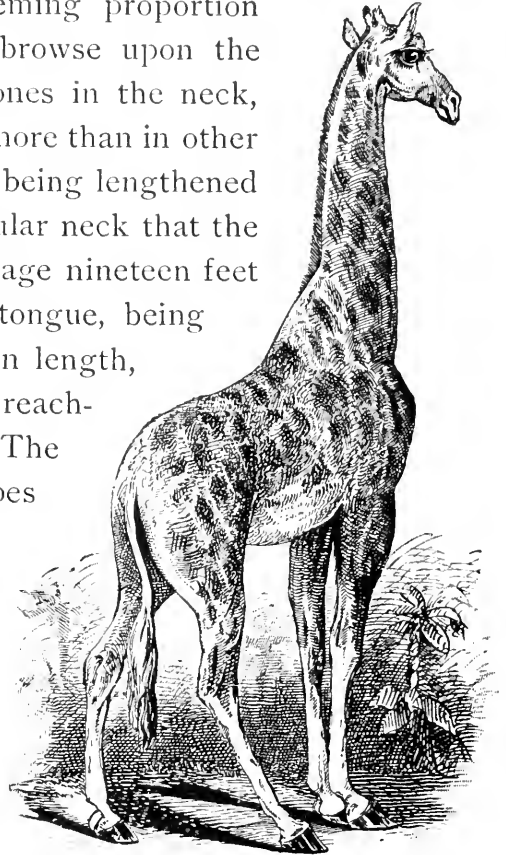


FIG. 129. — THE GIRAFFE.

taining a high rate of speed. The Africans follow it on foot or horseback, and hamstring it with swords, or shoot it down, its skin being highly valued. So tall is the giraffe, and so remarkable its color, that when feeding among lofty trees it is often lost to sight, resembling a tree itself and escaping by what is termed a protective resemblance.



## XVII. THE OX AND THE BISON

The oxen are typical herbivora. They are heavy and slow of motion. Their horns are short except in the peculiar Texan longhorns and a few others. They include the animals really the most valuable to man; beef, of all foods, being the most uni-

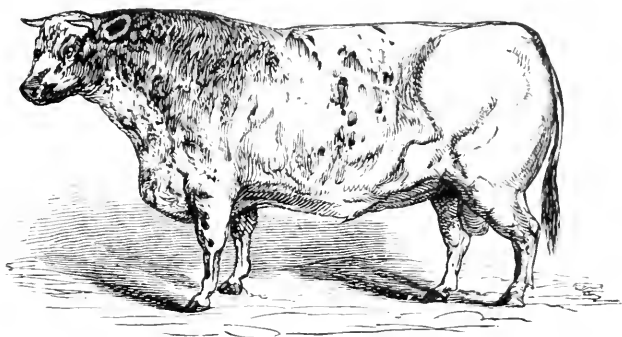


FIG. 130. — A DURHAM BULL.

versal among civilized nations. In America stock raising and the various industries connected with it constitute a

trade the magnitude of which has not been fully estimated.

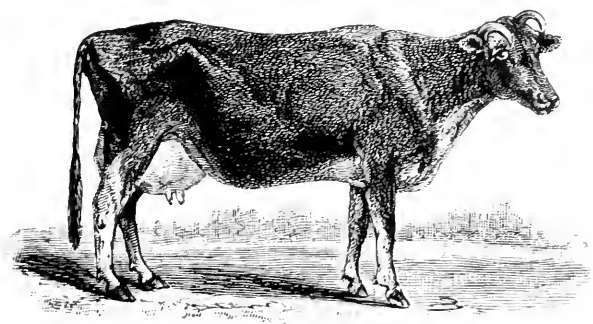


FIG. 131. — A JERSEY COW.

Domestic cattle have been bred so thoroughly that they present many varieties,

as the shorthorn or Durham (Fig. 130), the Jersey, so famous for its milk (Fig. 131), and the Ayrshire

(Fig. 132). All are mere varieties of the same form, like the wild cattle, some of which are still preserved in the Chillingham Park, England.

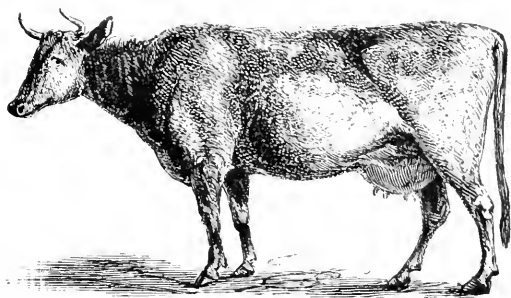


FIG. 132.—AYRSHIRE COW.

Of this group the American bison is perhaps the most interesting, as an example of the swift and almost complete extermination of a very

prolific race. As late as 1870 the Western plains in places were covered with countless bisons (Fig. 133), a huge, humped, grizzly giant that roamed the country in vast herds and constituted the food and raiment of a majority of the American Indians. To-day

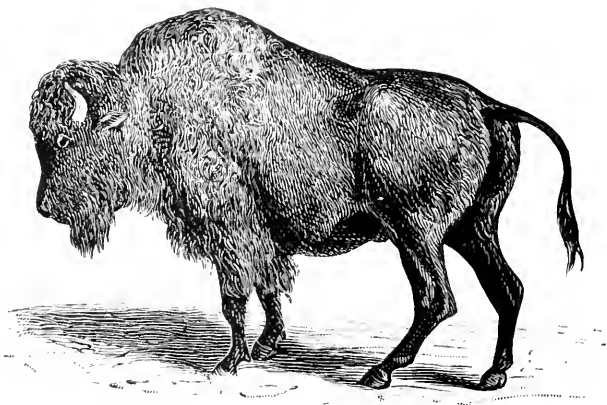


FIG. 133.—THE BISON.

hardly two hundred pure-blooded bisons can be found in all America. These are in private parks, the owners holding them at extraordinary prices, and striving by every means to save the race from extinction. No more remarkable spectacle of the reckless killing of animals is known; men were hired to shoot them for their tongues and the skin, and tens of thousands fell. Fifty years ago these herds

were one of the wonders of the West, and the Indians followed them with reckless daring, but to-day they are a mere memory.

There is a European bison that bears a close resemblance to the ordinary American form. It has been saved from extinction by the various emperors of Russia,

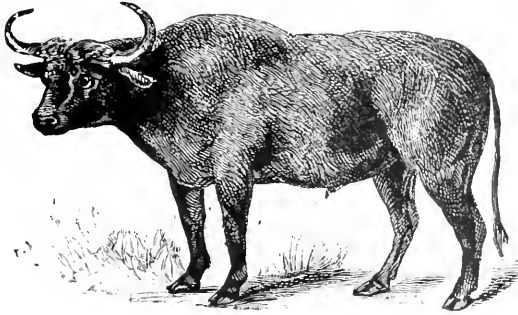


FIG. 134. — THE INDIAN BUFFALO.

who have succeeded in collecting a herd of about eight hundred in the forest of Bialowicza, Lithuania, and have prevented the destruction of those running wild in the Caucasus.

Allied to the bison is the Indian buffalo, with its enormous horns and slight hump. It is a most savage animal to hunt (Fig. 134), yet it has been domesticated, and in the Philippines is one of the most valuable of animals, in fact the only one that can be used in the flooded rice fields. This buffalo is a water-loving form, more at home in some swamp than on dry land.



FIG. 135. — THE YAK.

In Central Asia the yak (Fig. 135) is one of the valuable animals. It is found wild in the semi-mountainous

districts and is easily domesticated. Imagine an ordinary cow covered with long hair, and having the tail of a horse, and some idea may be had of this strange but valuable

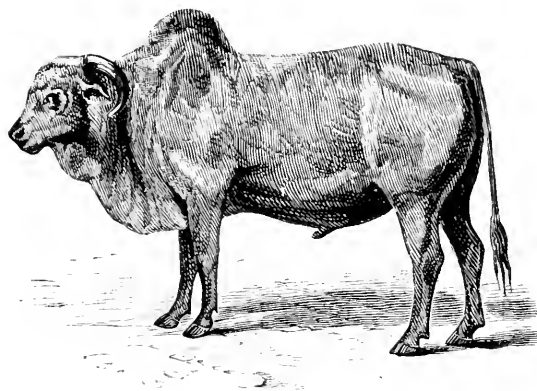


FIG. 136.—THE ZEBU.

creature. In India the zebu (Fig. 136) roams and is utilized to some extent.

To this group belongs the small sacred bull of the Hindoos. One of the remarkable sights in India is to see this sacred bull walking

through the streets, pushing men and women to one side, eating from stands, and pilfering where it will, without the slightest objection on the part of the owner.

The zebu has a small but very prominent hump, while the huge gayal, another East Indian buffalo, has an enormous hump, huge, conical horns, and a broad, massive head. A similar form is the gaur.

## XVIII. THE CAMELS

For ages the camel has been an aid to man, especially on the African deserts, where it has made trade possible. The long caravans are the substitutes for railroads in those regions. These animals (Fig. 137) are particularly adapted by nature to life in heated wastes. The feet are provided with remarkable cushions, or pads, while the paunch contains a series of cells, or accessory water tanks, for holding an extra supply of water upon which the animal can draw as occasion demands.

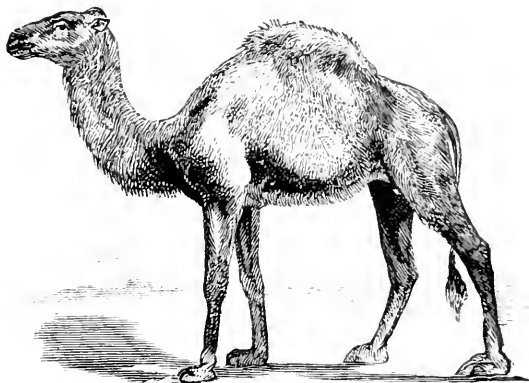


FIG. 137.—THE CAMEL.

They have either one or two humps of fat, which enable the animals to pass days without food. Add to these great endurance, pluck, and courage, and we can easily understand why the camel can cross the great deserts with a short supply of food and water, and brave conditions which would result in the death of other animals.

In Arabia, Syria, Persia, and Africa the single-humped camel, or dromedary, is employed as a beast of burden and for riding. A corps of native cavalry is mounted upon them, and such a steed will carry a man at a rapid

rate one hundred miles a day. In a caravan, from six hundred to one thousand pounds weight is considered a fair load. The finest camels bring a high price. To their owners they have gaits which are as well defined as those of horses, though to a novice the best gait is a tiresome and nerve-racking series of jerks. The camel has all the appearance of docility and meekness; but in reality it is an ill-tempered beast, as obstinate at times as the worst

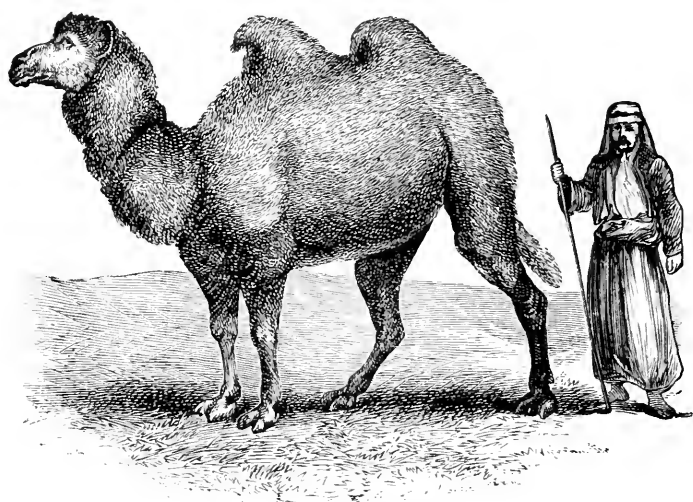


FIG. 138.—THE BACTRIAN CAMEL.

of mules. The young camels which I have seen are most interesting little creatures and are about three feet high when born. They attain their full growth in seventeen years, and live for about fifty years.

The two-humped or Bactrian camel is a native of Central Asia (Fig. 138), and is equally valuable, long trains being seen all over India, China, and neighboring countries, performing all the work of the modern railroad. Every part of the camel is of use, from its milk to its hair,

which is made into the famous shawls. No other animal, perhaps, with the exception of the horse, has served man so well, and certainly no other receives such hard treatment. A number of years ago our government introduced a number of camels into the desert regions of the West, hoping to use them in transportation, but they were



FIG. 139. — THE LLAMA.



FIG. 140. — CLAWS OF THE LLAMA.

found unavailable. Several broke away, and for a number of years, it is said, increased; and possibly some may be found there to-day.

Allied to the camels is the llama of South America (Fig. 139). As in the camel, each toe has a cushion, or pad (Fig. 140), and the toe itself is curved, aiding it in climbing the rocky mountain passes. The animal has, like the camel, a very questionable temper, yet it is forced to do good service as a domestic animal. Very similar are the guanaco and the alpaca, both valued highly for their hair.

## XIX. THE FLESH EATERS

A large and varied group of animals is known as the carnivora from their flesh-eating habits. They include the



FIG. 141.—A FAMILY OF LIONS.

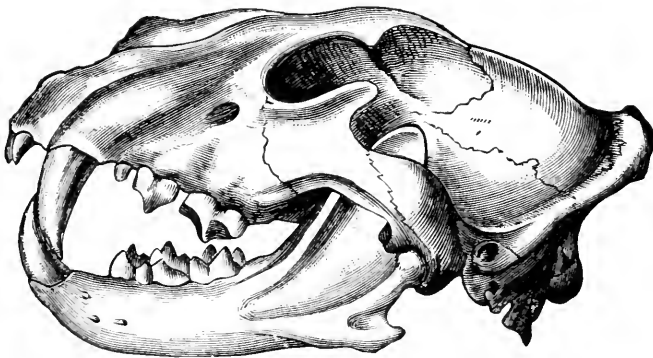


FIG. 142.—TEETH OF A LION.

lion, the tiger, and others, and are found all over the world. They range from the great cat of India down to some of the smallest of the mammals. All, or nearly all, prey upon other animals, and are supplied with sharp teeth and claws.

No one could mistake the lion (Fig. 141) for a seed or fruit eater. Its huge canine teeth (Fig. 142)



are adapted to tear and rend its prey, and are of enormous dimensions, recalling the teeth of the saber-toothed tiger of Quaternary times. If the teeth did not tell the story of the habits of the carnivores, the claws (Fig. 143) surely would do so. The lion is one of the highest of the group, a noble, fear-inspiring, and beautiful cat,

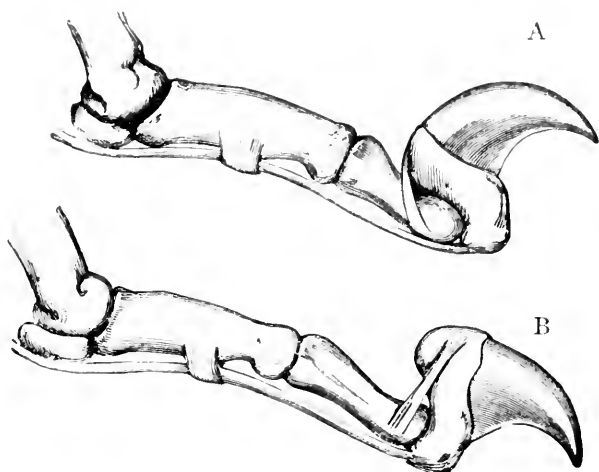


FIG. 143. — CLAWS OF A LION.

fierce of countenance and almost human in its dignity. The lion is a typical cat. It steals upon its prey and is actuated by motives not the most admirable. When faced in the open a lion or even a tiger will often sneak away, but on a dark night it will crawl upon animals or men, and suddenly spring upon them exactly as a cat leaps upon a helpless mouse. In a word, the alleged noblest of animals is a sly, treacherous pot hunter that would lie in wait a day to take an enemy at a decided advantage, and is rarely known to make a brave, open fight.

There are two lions: one from Africa, with a full mane; and one from Asia, with little if any. Few other animals are so powerful and strong for their size. One has but to study the skeleton of a lion to understand how it can carry off an animal as large as a cow. One of the most interesting families it has been my fortune to see was

a number of lion pups, the mother of which had died at their birth. The cubs had been adopted by a large dog, who cared for them tenderly. As the lions grew, she seemed at times to be amazed at their size and strength, and finally they were so rough with her that they had to be separated.

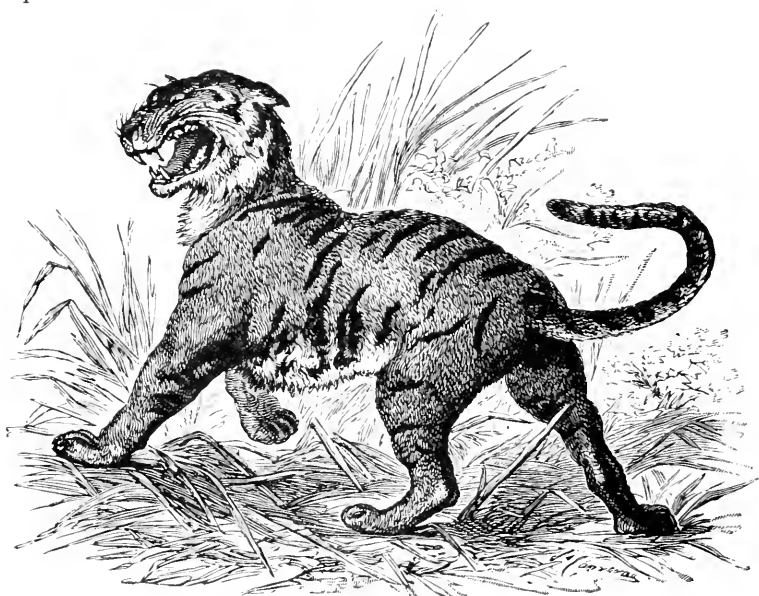


FIG. 144.—THE TIGER.

The tiger (Fig. 144) is a royal beast, and so far as bravery is concerned may be placed at the very head of the cat family. Beautiful, sleek, richly marked, with a terrible eye, fiery and blazing, it is a type of the majesty which characterizes these splendid animals. The tiger belongs in India, and every year the death rate charged to this great cat is appalling. In a single year nearly one thousand men, women, and children have been carried off by them in southern India alone; and in Singapore it is estimated that a native a day is the average for the tigers

of that locality. Sometimes the great cat meets an enemy in the crocodile, which overpowers it. Tiger hunting in India is royal sport, and is generally conducted on elephants. Often the powerful cat will leap upon the back of one of these huge animals and endeavor to strike down the rider.

Almost as powerful is the leopard (Fig. 145), a beautiful, spotted creature, shy, courageous, active. In India the

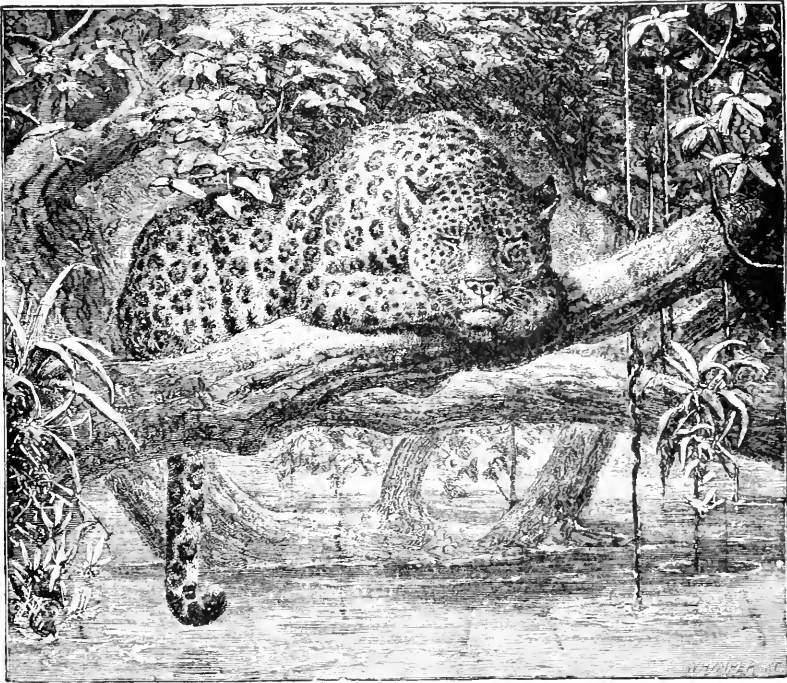


FIG. 145.—THE LEOPARD.

leopards kill about a third as many human beings annually as do the tigers. All these animals are protected in a certain sense by the resemblance of their skins to their surroundings. The tawny color of the lion simulates the gray tones of the arid desert. The leopard is one of

the most beautiful of animals and ranges the dense jungles of Asia, Africa, and the Indian Archipelago. The black leopard is one of the most ferocious of the tribe, almost the only cat that can not be tamed or is not amenable to kindness.

The ounce is as large as the leopard and is an allied form. In America the largest cat is the jaguar (Fig. 146), the tiger of America, ranking third from the lion in size,

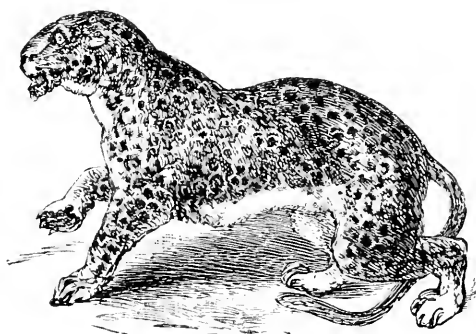


FIG. 146.—THE JAGUAR.

power, and ferocity. What the tiger is to India, this beautiful leopardlike cat is to South America, which is at its best in the deep forests of the Amazon, preying upon all animals. It finds its way into Texas and New Mexico and as far

north as the Red River in Louisiana. Everywhere it is dreaded by man and beast.

The typical big cat of North America is the panther (Fig. 147). It has a remarkable range from the far North to Patagonia. In the East and in Florida, where I have known it to swim out to small keys to steal the pigs of a planter, it is the cougar. In the Adirondacks it is the panther. In the Southwest it is the mountain lion, a vigorous and cunning hunter, but more cowardly than a lion when faced by man. Its principal prey is deer, to obtain which it makes remarkable leaps of forty or fifty feet from an elevation.

Among the minor carnivora the ordinary cat and the



FIG. 147.—THE MOUNTAIN  
LION OR PUMA.

time, and this on the border of Pasadena and in the city limits of Los Angeles. The ocelot is a beautiful cat from the Southwest. The margay, the cheetah, or hunting leopard, and the caracal are others of this interesting group of cats or catlike animals.

lynx (Fig. 148) may be mentioned. The latter is a fierce cat with tufted ears, preying chiefly upon rabbits. Several varieties are common in the South-



FIG. 148.—THE LYNX.

west, where they are known as wildcats. Within a rifle shot of my home the hounds could until lately start one at any der of the town

## XX. THE BEARS

The bears have a wide range all over the world and are more or less valuable to man. In the far North we find

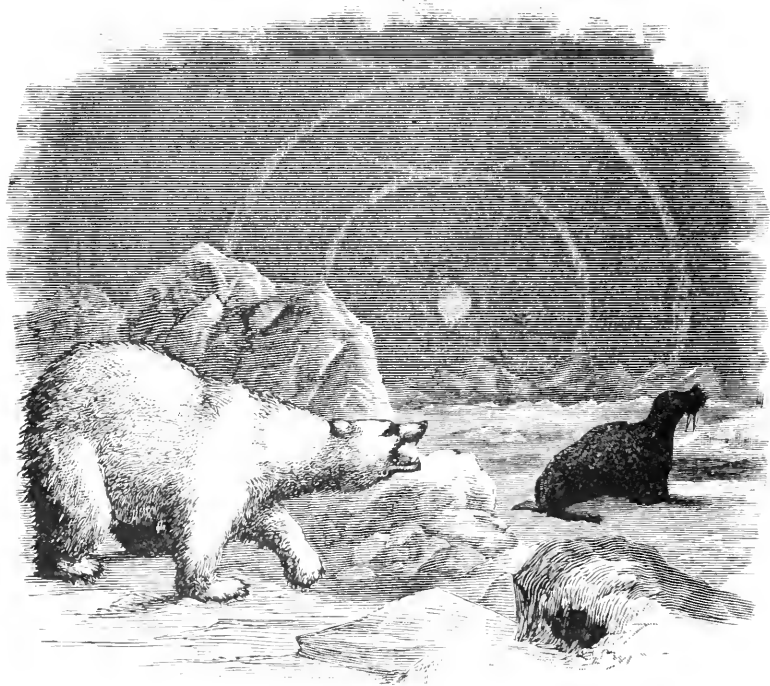


FIG. 149. — THE POLAR BEAR.

the polar bear (Fig. 149), with its pure white coat rendering it almost invisible on the snow. It is a powerful creature capable of killing the largest animal.

The bear has peculiar feet; in a word, it is a plantigrade animal, walking with the heel flat upon the ground. The skeleton of the bear shows the enormous power of the

animal, while a glance at its teeth explains how the polar bears can tear down the heaviest rock, and play havoc with almost any contrivance that man can think of.

The polar bear has the soles of its feet covered with short bristles or hair, a provision to enable it to walk on the ice. The foot, its principal weapon, is a sixth the



FIG. 150. — THE BLACK BEAR.

length of the entire body. This huge bear preys upon seals, walruses, and other animals. It is often seen floating on ice floes in the polar sea, where it has been trapped. A portion of the year it spends in a state of hibernation, a winter sleep, in which all the functions of life are at an almost complete standstill, the animal drawing upon its reserve supply of fat to sustain life. At

this period the polar bear forms a den and is literally snowed in, coming out lean and ugly in the early spring.

The black bear (Fig. 150) is a well-known form. I have seen it crossing my path in the Adirondacks, and its tracks are common in the mountains in California. In the Yellowstone Park these bears are so tame that they come up to the hotels to eat the garbage thrown out to them. The black bear is fond of berries and fruit, not being confined to flesh, though it will not refuse it.



FIG. 151.—THE GRIZZLY BEAR.

The king of the bears is the famous grizzly (Fig. 151), the largest and most powerful of the entire tribe, easily killing large animals with a blow of its enormous claw. In the early days in California it was one of the sports to ride out and lariat the grizzly, so plentiful were these animals. But they are now so rare that in the San Gabriel Valley only one or two have been killed in ten years.



The Syrian, the Malay, and the sloth bear of India are others of this interesting family. All are famous honey lovers and robbers of bees (Fig. 150). Allied to the bears are the raccoon (Fig. 152) and the interesting night animal, the raccoon fox (Fig. 153).



FIG. 152. — RACCOON.

The dogs, foxes, and wolves constitute a well-known group. They have a wide range, being found nearly all over the world. Even on the islands of San Nicolas and Santa Catalina, off the Pacific coast, a little fox is found. It resembles the common fox of the mainland, but is smaller. The Arctic fox is a rare and beautiful form, pure white in winter and brown in summer. It lives in burrows, twenty or thirty together. The gray,

prairie, silver, coast, and cross foxes are others more or less familiar.

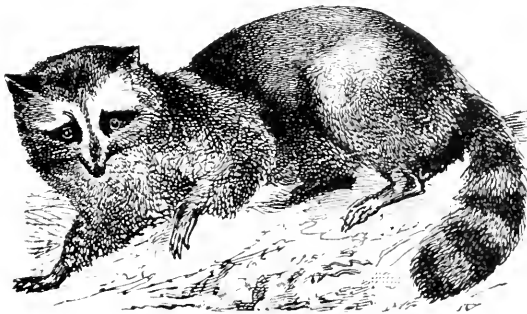


FIG. 153. — RACCOON FOX.

wooded regions of Europe and Asia. It is a fierce, predatory animal, with far greater courage than the lion or tiger. It attacks man or beast, and is possessed of an

The wolf, a huge form (Fig. 154), is confined to the mountains of the Southwest and to the



FIG. 154. — THE WOLF.

amount of cunning that makes it at times more than a match for man.

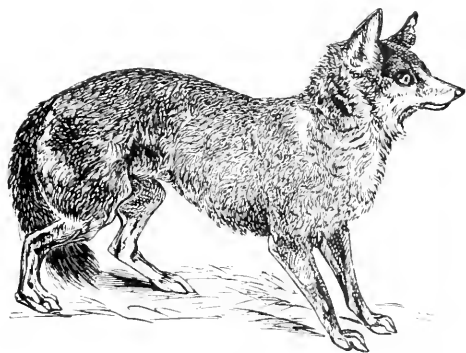


FIG. 155. — JACKAL.

Some of these animals are a menace to the ranchers but afford excellent sport to the hunter. The most invigorating, exciting, and dangerous sport I have ever indulged in

The jackal (Fig. 155) is a European form. The hyena (Fig. 156) appears to represent the wolflike animals in the warmer regions of the Old World, and is a disagreeable, cowardly scavenger.

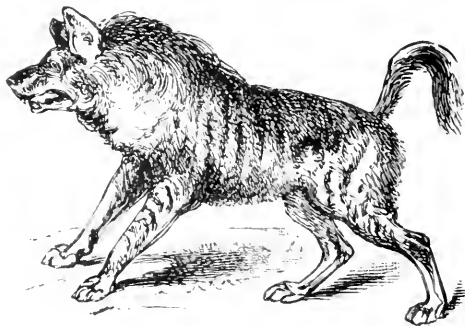


FIG. 156. — HYENA.

was chasing the lowland wolf or coyote with greyhounds. In England the red fox, a cunning, clever creature

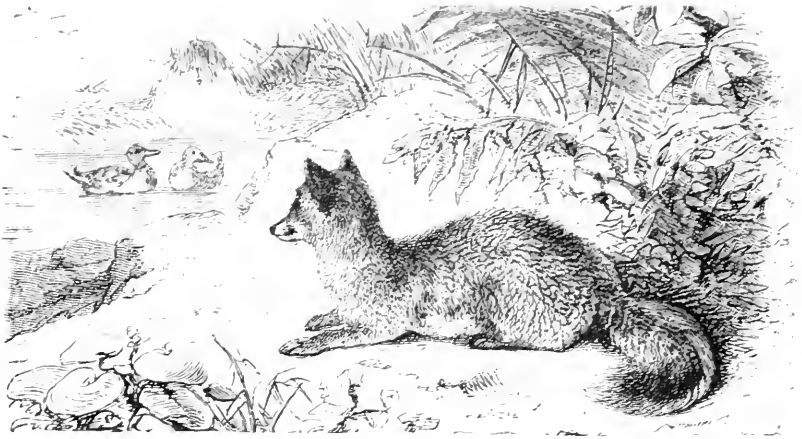


FIG. 157.—THE RED FOX.

(Fig. 157), is hunted with foxhounds. The smaller flesh eaters are almost innumerable, and many are very inter-



FIG. 158.-- THE OTTER.

esting. Among them is the otter (Fig. 158), found formerly in great numbers in America from Hudson Bay to

the Gulf of Mexico. It is now very rare. The Pacific coast islands were formerly the seat of important fisheries, but in eighteen years I have seen but one otter, the little animals having been almost entirely exterminated.

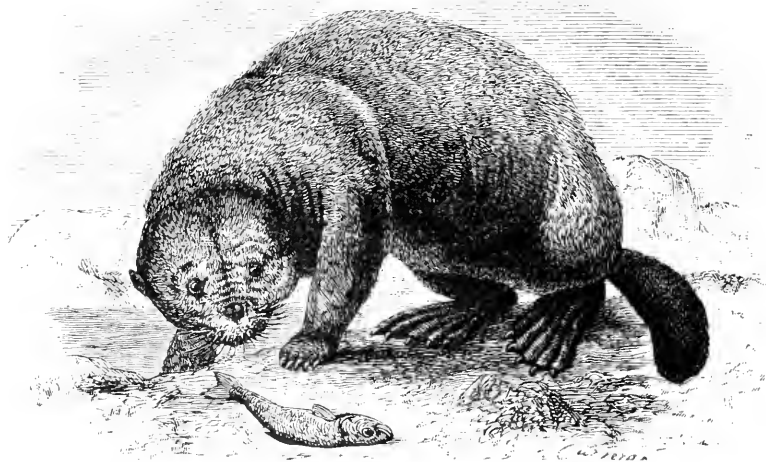


FIG. 159. — THE SEA OTTER.

The sea otter (Fig. 159) is a large animal attaining a weight of eighty or more pounds. It is famous for its playfulness. It has enormous hind feet, which are webbed;

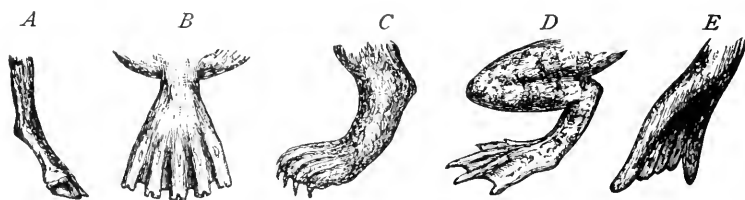


FIG. 160. — FEET OF MAMMALS.

indeed, its feet are so peculiar that it is interesting to compare them (Fig. 160) with those of other animals to illustrate the strange modifications to suit place and circumstance.

The skunks, so far as color is concerned (Fig. 161), are among the most attractive of animals; but they secrete so powerful a fluid that it places them beyond practical ownership; yet the flesh of the skunk is said to be one of the most delicate of all meats. The secretion which is so disagreeable is confined to a peculiar gland and is a protection to the animal, being simply overpowering in its effects.



FIG. 161. — THE SKUNK.



FIG. 162. — THE BADGER.

Similar forms in general appearance are the badgers (Fig. 162), which are common in the West. They flatten



FIG. 163.—THE WOLVERINE.

when hunting on the mesas. They dig deep burrows.

One of the fiercest animals in the North is the wolverine (Fig. 163), the inveterate enemy of the beaver. The mink (Fig. 164), the ermine (Fig. 165), the



FIG. 164.—THE MINK.

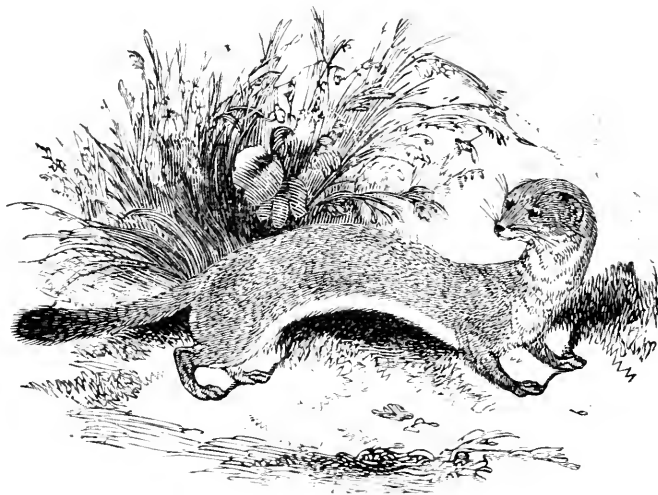


FIG. 165.—THE ERMINE IN SUMMER.

fisher, and the marten (Fig. 166) are others all valuable for their fur. The ermine is remarkable for its winter

themselves out upon the ground so that they can hardly be seen, and I have often almost walked over them in California



FIG. 166.— THE MARTEN.

change of color, being brown in summer ; but as winter comes it changes to white and is almost invisible on the



FIG. 167.— THE ERMINE IN WINTER.

snow (Fig. 167). It is one of the most valuable of the fur-bearing animals.

## XXI. THE SEALS

The flesh eaters are by no means all land animals. The seals, sea lions, and walruses are all carnivora of the sea, living upon fish, which they capture with ease. The sea lion is common on our Western coast, and at the islands off the California coast there are several rookeries. The Catalina animals are so tame that they allow boats to approach so closely that they can be photographed. At

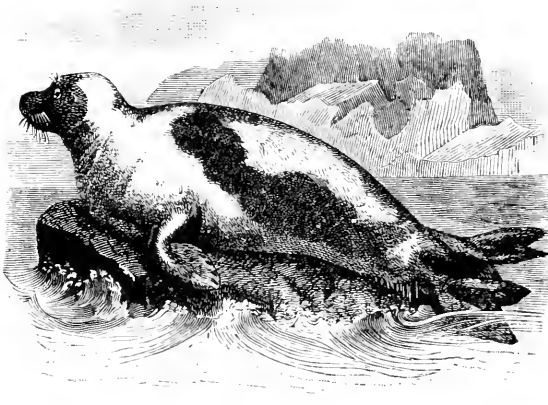


FIG. 168.—THE HARP SEAL.

night the sea lions leave their rocks, which are at the south end, and swim around the shore, entering the Bay of Avalon with loud barks, eating the dead fish, and proving themselves valuable scavengers. They often steal fishes from nets, and on the north coast near San Francisco have proved such a nuisance that they are being killed off. The sea lion is of little use to man, the oil having only a small value.

The seals are common in many bays. The harp seal (Fig. 168) is one of the most attractive, while the Greenland seal is also a valuable catch for its oil and skin. The



fore limbs of the seals are flippers for swimming, the hind limbs being close together. In the water they are very active, easily catching almost any fish; but on land they are clumsy and ill at ease. They are mild and gentle creatures, a sharp contrast to the bull sea lions, which I have had charge at me with open mouth in the rookeries on the island of Santa Cruz.



FIG. 169. — THE FUR SEAL.

The seals, like the sea lions, live in herds, and the mothers are very solicitous for their young, holding them while in the water and teaching them to swim as would a man. The breeding season sees the beach covered with huge sea lions and the small young ones, which are almost helpless.

The fur seals are very valuable on account of their fur. They go to the south in winter, returning to the rookeries in Alaska in early spring (Fig. 169). They assemble there by thousands, where they are carefully guarded and killed under a system that will not deplete them. Piratical fur traders have threatened the existence of the herds more than

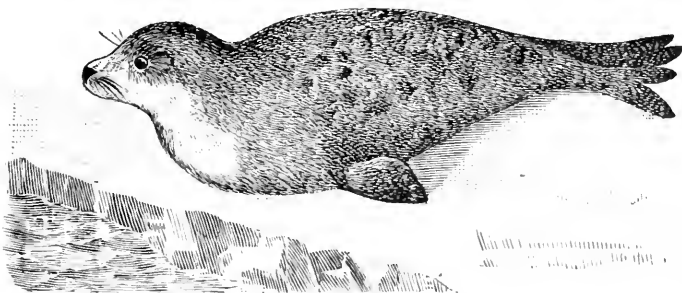


FIG. 170. — THE HARBOR SEAL.

once, and international complications have ensued. The harbor seal (Fig. 170) is a common form

in Atlantic harbors. It is very intelligent, and easily trained to perform many tricks.

In the North, amid the ice floes on the shores of



FIG. 171. — THE WALRUS.

the Arctic Ocean, is found the walrus (Fig. 171). It is a huge seal-like creature in which the tusks are enormously developed as weapons of defense and offense, and by which it clings to the ice and hauls itself up.

It is hunted by the natives for the blubber and skin, while the tusks are highly valued as ivory, or to be made into various objects. The skull is very solid (Fig. 172), a ponderous brace for the powerful tusks.

One of the most interesting animals of this group is the sea elephant, a huge seal, twenty feet in length. It is now confined to the Antarctic islands, where it is hunted for its oil, and is destined to extermination in the near future.

A characteristic feature is the short proboscis, calling to mind the trunk of an elephant, which becomes inflated when the animal is enraged. Up to 1859 these animals were common at Santa Catalina Island, a large herd living at what is called the Isthmus. The last ones were destroyed in that year by Captain Scammon and his crew.

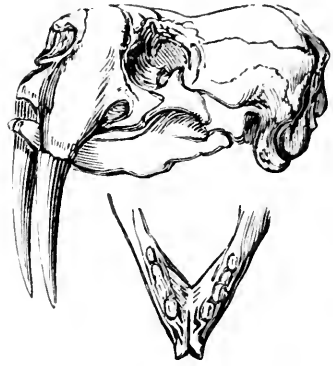


FIG. 172.—SKULL OF A  
WALRUS.

## XXII. SEA-LION ROOKERIES

The sea lions of the Pacific coast have been so well protected by local laws or sentiment that they have increased in numbers, and it is now possible, especially in Southern California, to visit several of their rookeries, or homes, and observe the animals at leisure. The most available locality is at the island of Santa Catalina, off Los Angeles County, where these animals have been especially protected. The principal rookery is on the extreme southeast end of the island, on what are known as Seal Rocks, where a number of large sea lions have made their home. They are so tame that glass-bottom boats approach them within a few yards, and visitors photograph the big animals in a variety of positions; as a rule, they refuse to leave the rocks until the boat is alongside. They generally lie basking in the sun most of the day, doing much of their feeding at night, though this is by no means a rule. Their positions are often striking.

The bulls, heavy and ponderous, sit upright generally, with heads pointed into the air, and doubtless doze in this position. In early summer they all leave the rocks and go ashore on the beach, a few yards distant, and here the young are born, the herd remaining until the little ones have learned to swim — a matter of several weeks, for they are very helpless at first. For a long time the herd, or part of it, left the rocks in the evening and came up to the town

of Avalon on the little bay of that name, swam alongshore, leaping and diving, and went up the island no one knew how far; but so many fishes are brought into Avalon now that the herd, or two large bulls and a number of females, come up to Avalon every day and take part in a remarkable exhibition — that of being fed from the beach by the boatmen.

The herd is in the water eight or ten feet from the shore leaping and playing, the young and females gamboling like

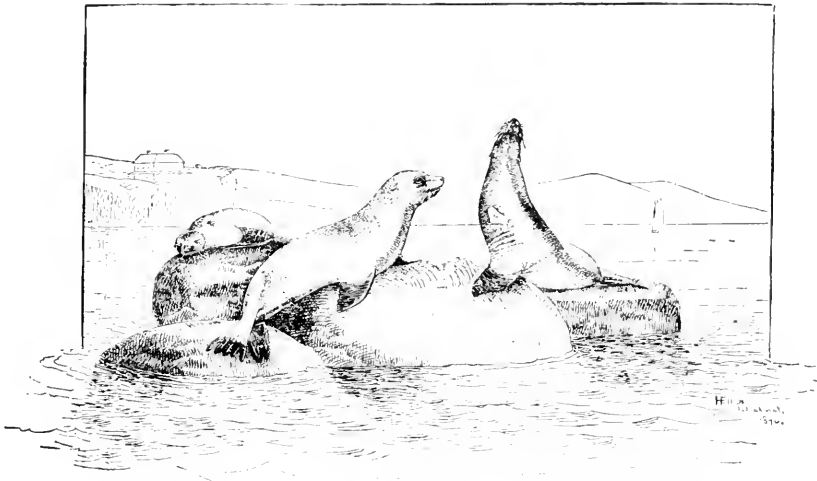


FIG. 173. — SEA LIONS: MALE (RIGHT) AND FEMALE.

sea otters, darting out of the water two or three at a time in a most graceful series of movements; while the ponderous bulls, which appear to weigh at least half a ton each, hover about waiting for an invitation from the beach to land.

This soon comes. A tourist asks if they are really wild sea lions, and if they are tame. At this a man takes an albacore from a hook and walks down to the water, out of which comes the extraordinary bull sea lion known as

“Bill,” a colossal animal appearing more like a huge caterpillar, or a gigantic slug, than anything else. He would doubtless take the fish from the man’s hands, but the latter backs up the beach and the bull follows, galloping along head high in air, eyes gazing fixedly at the fish, while his companion follows not far behind, the females and young remaining in the water. In this way the fisherman leads the bull up the beach twenty or more feet from the water, a remarkable and interesting spectacle hardly to be believed if not witnessed. The secret of the confidence which the animals display lies in the fact that the sea lions are never frightened or abused in any way and have perfect confidence in the men.

Often during this strange exhibition great flocks of sea birds — pelicans, cormorants, divers, and gulls — gather at the feast, the collection affording a striking illustration of the tameness of wild animals. The sea lions have increased so rapidly that there has been a separation, and a new rookery has been established halfway up the island, and they are found at various other points on the south side.

On the island of San Nicolas, ninety miles from here, I found several large rookeries, and at San Clemente Island there are a number. I also located several at the island of Santa Cruz ; indeed, all the channel islands have them, but the most remarkable place is the large oceanic cave north of Point Diablo at Santa Cruz Island. Here the ocean in ages has eaten into the mountain until three distinct rooms or chambers have been formed, beautifully colored, producing a strange assortment of tints so vivid that the name Painted Cave is given the place. The opening resembles

a Gothic arch and is so situated that its entrance is in smooth water when the wind is in the west, as the prevailing wind is all summer. The day I rowed into the outer cave the entrance was perfectly smooth, but every few minutes a swell came in which did not break.

The arch is forty or fifty feet in height and leads into a great room. From this we rowed into a second, and here the opening into the real cave under the mountain was visible. It was large enough to admit a rowboat by pushing with hands against the side walls. As we floated into the clear water in which myriad colors appeared to play, I heard a distant roar and knew that we were in a den of the sea lions. At that moment a wave rolled in, completely filling the opening and passing on. It was evident that to be caught in the opening was to court disaster, so waiting until the next wave came we pushed the boat through the narrow tunnel immediately after it, and entered the largest room in total darkness, the opening appearing like a star. How high this chamber was, or how deep, we could not determine, our flambeaux not showing the ceiling. When the next wave came in, its noise aroused a thousand echoes which seemed to swing back and forth from the unseen wall, creating a pandemonium of sounds.

Exactly how large this cave is, was difficult to determine, but that it had radiations and lateral caves running off in every direction was very evident, as the sea lions leaped from the sides into the black water with loud roars, and their barking could be heard far away, reverberating in the unknown caves seemingly in the heart of the mountain itself. It was easy to realize how the report gained cre-

dence that the entire mountain is undermined with caves filled with water.

As the sea lions leaped from the ledges, frightened by the flambeaux we waved, they rushed for the small star-like opening, crowding through it, and we reached the entrance in time to see them swimming away, led by a large bull, with heads high out of the water, uttering angry barks.

Not far from this strange rookery I found a large one on a ledge of rocks and went ashore to investigate, when the sea lions came sliding down the kelp toward me in a menacing manner, particularly a large bull who, opening his mouth, came at me with a peculiar rolling gait, presenting a formidable appearance. I had the alternative of holding my ground or jumping overboard, so faced the bull and put on a front of boldness I did not exactly feel, as the big animal on the slippery kelp could easily have bowled me over. But I succeeded in intimidating him so that he passed several feet from me and plunged into the sea followed by the band. There are a number of rookeries on this island and on the others of the group.



## XXIII. THE MONKEYS

The primates constitute the highest group of animals: the monkeys, apes, and man. Many have a manlike appearance, and a comparison of the skeleton of a man with that of the

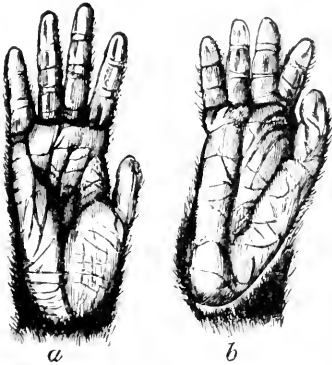


FIG. 174.—(a) HAND, (b) FOOT, OF CHIMPANZEE. (After Voght.)

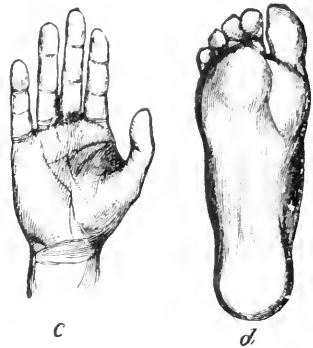


FIG. 175.—(c) HAND, (d) FOOT, OF MAN.

higher forms of monkeys shows a remarkable resemblance (Fig. 177). The body is carried very erect, the arms are used as in human beings, and the hands (Figs. 174, 175)



FIG. 176.—THE AYE-AYE.

are very similar to those of man. The hind foot of the monkey is also a hand, in which the thumb is appposable to the other fingers.

Among the lower forms are the beautiful little lemur of Madagascar, and the aye-aye (Fig. 176),

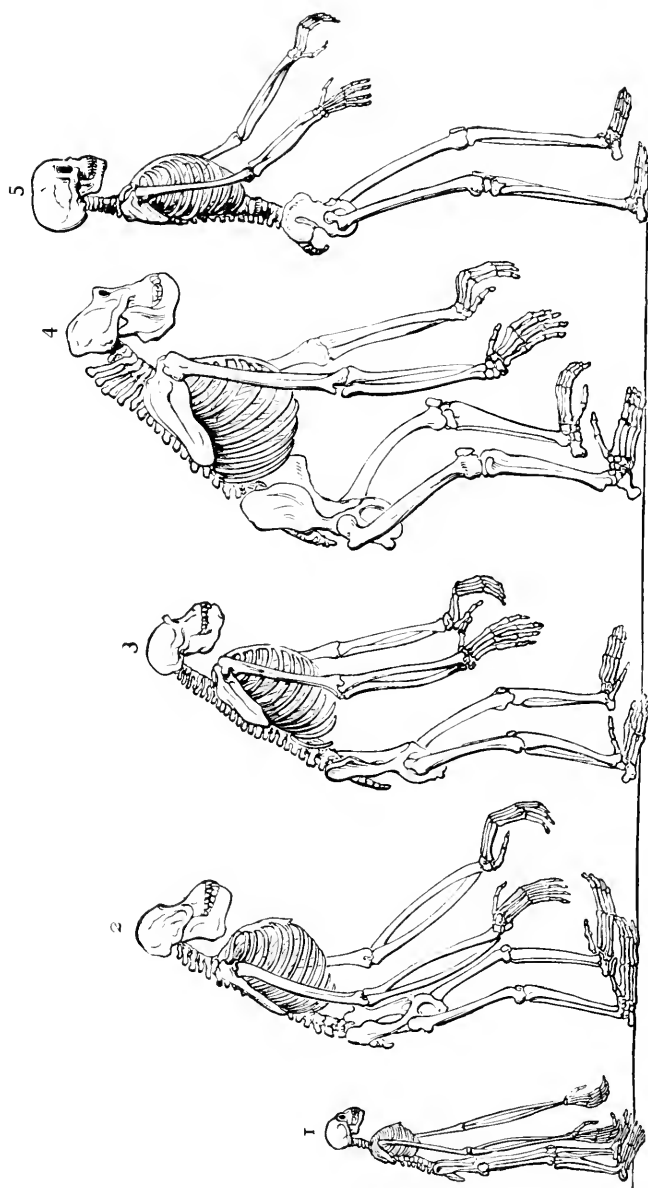


FIG. 177.—SKELETONS OF PRIMATES COMPARED.

1, gibbon; 2, orang; 3, chimpanzee; 4, gorilla; 5, man. (After Huxley.)

noted for its enormously long fingers, its large ears, and bushy tail. Another, the specter, found in the East Indies (Fig. 178), has singular pads upon its fingers and toes, and large round eyes, telling of its nocturnal habits. It has long hind legs like a kangaroo, and is altogether one of the strangest of animals. The loris is a graceful little creature, found in the forests of Ceylon and Java. It is a night lover, preying upon birds,

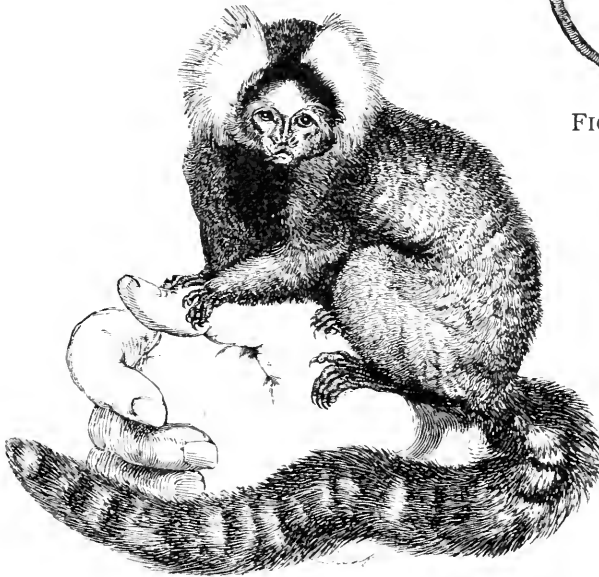


FIG. 179.—THE MARMOSET.

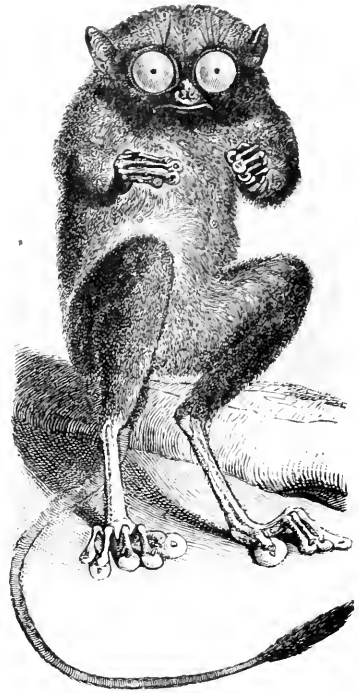


FIG. 178.—THE SPECTER.

though it is a fruit eater as well.

Approaching the typical monkey form is the marmoset (Fig. 179), many beautiful varieties being known in South America, all making interesting

pets. All these small animals serve as introductions, as it were, to the manlike forms of the Old and New Worlds, comprising monkeys and apes of many kinds.



FIG. 180. — THE WOOLLY MONKEY.

The woolly monkey (Fig. 180) is a typical form showing the prehensile tail by which they cling to branches, really a fifth hand. A remarkable form is the bearded monkey (Fig. 181), which has a perfect beard and a head of long, black hair. The howling monkey is famous for its vocal accomplishments, for which, indeed, nearly all the tribe are known. The ease and skill

FIG. 181.  
BEARDED  
MONKEY.

with which the prehensile tailed monkeys cross rivers and hurl themselves from tree to tree can hardly be imagined unless seen. One monkey will grasp another (Fig. 182)



FIG. 182.—MONKEYS CROSSING A RIVER.

until a chain is formed which is started to swinging. Finally the lowest monkey grasps a tree on the opposite side, and a living bridge is formed over which the young

and others pass. Such a performance requires no little intelligence to carry out successfully. I have seen one

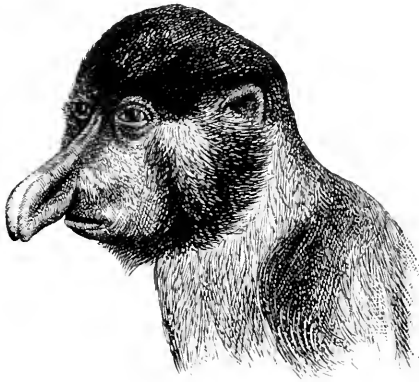


FIG. 183.—THE PROBOSCIS MONKEY.

of these monkeys lower its tail from a tree, and seizing a puppy, lift it up and carry it to the top of the tree.

The proboscis monkey (Fig. 183) is a singular form, almost human in its expression. On the coast of Africa is found the mandrill (Fig. 184), a large, short-tailed monkey with a

strangely colored face, which appears as though it had been painted red and blue. A large ape still frequents the rock of Gibraltar, having lived there for centuries.

In South Africa and the Malay country the gibbons are found, which, while they have no tail, have long arms by which they literally fling themselves from limb to limb.

In many of the old books relating to Africa, references are made to hairy men of gigantic strength, found in the forests of that continent. It is now believed that these references were to the gorilla (Fig. 185). This animal is one of the fiercest and



FIG. 184.—THE MANDRILL.

most terrible of all the monkeys found in equatorial Africa. It lives in small families led by a male, and forms a nest

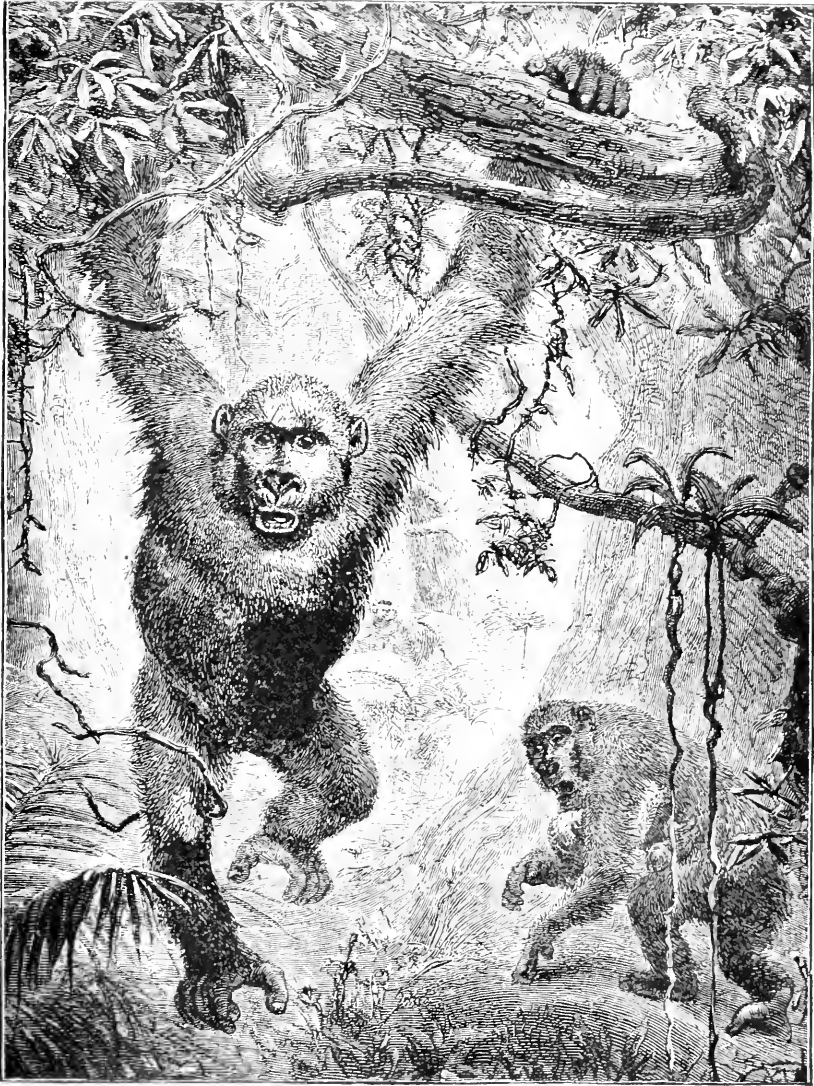


FIG. 185. — THE GORILLA.

in trees which it soon deserts, having no permanent home. It attains a height of six feet and a weight of two hundred

pounds. Its forearms are long and very strong, so that it can easily crush a man to death. The hair, or fur, is black; the nose is flat; the ridges of the forehead

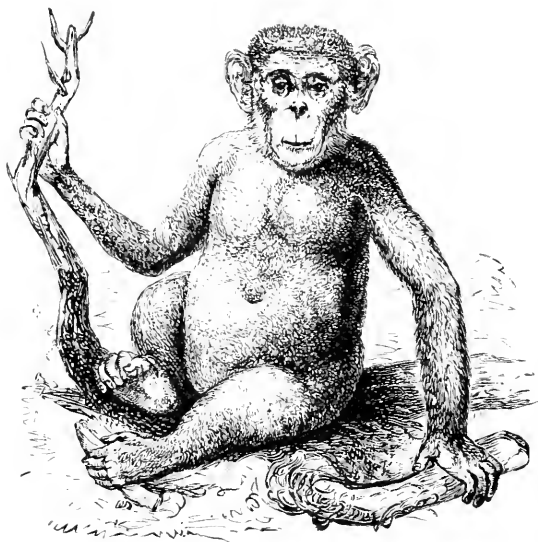


FIG. 186.—THE CHIMPANZEE.

are prominent; the teeth are powerful; and its expression is demoniac and terrible. When enraged the animal has a habit of roaring loudly and beating its chest with its clenched fist.

Ranking next to the gorilla in size is the chimpanzee (Fig. 186). Its skeleton tells the story

of its strength and power, while its general appearance is hideous and forbidding.

Perhaps the most human of all these forms is the orang-outang (Fig. 187), found in the islands of Borneo and Sumatra. It lives in the deep jungles, swinging from tree to tree, and rarely coming to the ground. In some, the face is surrounded by a singular, fleshy plate or pad, which gives them a strange expression. Many of these apes have been brought to America and trained. One which I observed, sat at a table and ate with better table manners than some people; it used a napkin, and after dinner smoked a pipe with all the



abandon of a human smoker. Many attempts have been made to teach them to speak, but all such efforts have failed.

None of these animals stand erect. In moving among the branches of trees they support themselves in an upright position by holding on with their hands; but when



FIG. 187. — THE ORANG-OUTANG.

on the ground, they “hitch” themselves along by pressing the knuckles upon the earth, or they crawl upon all four feet.

There is a wide mental gap between the highest form of monkey and the lowest type of man, represented by the Australian bushmen. When the skulls of monkey and man are compared, there is a vast difference seen (Figs.

188, 189). The brain of the orang has a capacity of but twenty-five cubic inches ; that of the chimpanzee twenty-six cubic inches, and that of the gorilla from twenty-five to

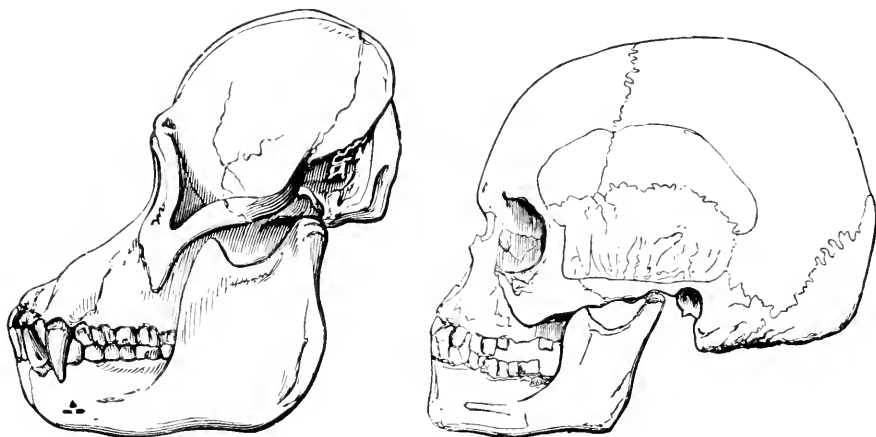


FIG. 188.—SKULL OF A CHIMPANZEE.

FIG. 189.—SKULL OF A MAN.

thirty-nine inches. In man it is twice as great, ranging from seventy-five to ninety-two cubic inches, so that a vast gulf separates man and the monkeys despite the close anatomical resemblance between the two.

## XXIV. EARLY MAN

No reference to the Mammalia is perfect or complete without mention of man, the highest primate, the highest form of the Mammalia ; for to-day science regards man as the most perfect type of animal life — an animal endowed with a high intelligence, mind, and separated from all the rest of animal life by a wide and unbridged intellectual chasm.

From earliest times the attention of man has been called to his own history and antiquity, and so diverse are opinions in different lands that the state of information on the subject may be said to be very unsatisfactory. But man has probably existed for millions of years, at least this is the opinion of the author, and authorities can be found who accord the earliest man a date anywhere from one to six million. It is conceded by the greatest scholars that there has been a progression of life from lower to higher forms in the life history of the globe. This will impress the most indifferent observer who glances at a geological map. The various ages from the first are well known, and in every great museum the animals of the various periods are shown. Thus it is believed in the late Archæan time plants appeared ; protozoans crowded them closely. Then in the Cambrian came the shells and radiates. Then in the lower Silurian came the fishes, in the upper Devonian the amphibians, and higher, in the Carboniferous period, the true reptiles. Higher up, in Cenozoic time, the first

mammals appeared, and finally, at the very top of the series in the so-called Quaternary period, comes man.

We believe this because geologists for many years have examined the rocks of each period with the greatest care, and in such museums as that at Central Park, New York, all the animals found in each period in the world's history are exhibited and named, and the periods are remarkably well defined. In the Devonian time no bone nor flint chip, suggesting man, has ever been discovered by the countless hunters.

The same is true of the age of Reptiles : the rocks have been searched with great care, and it is only in the deposits of the upper periods, if we may so call them, that bones of man, weapons, and various objects of his make have been discovered. So we assume that man is the last and most perfect mammal.

It is interesting to glance at the opinions of students of man as to his age. The age of the earth is given as anywhere from ten millions to sixty billions of years. Professor Fuhlrott gives the Neanderthal skull an age of three hundred thousand years. Mr. Hunt of the British Anthropological Society gives the age of man as nine millions. A. R. Wallace suggests five hundred thousand years, while Sir John Lubbock believes that man existed during the Miocene time, which may have been many millions of years ago. It has always been my belief that animals appeared on the globe soon after the conditions which permitted such life became permanent, and I believe man approximating his present form appeared many million years ago in the early days of the Eocene time, possibly earlier. Such a man may have lived in regions, now some

“Atlantis,” at the bottom of the ocean, and his implements may have been entirely of wood and so have disappeared.

Burial would hardly have been known to such a man, and bodies may easily have been destroyed while other animals living in the water were covered by mud and so preserved. Be this as it may, man has existed ages, so long that the mind of his modern representative can not grasp it.

The same uncertainty exists as to the land in which man first appeared. Some place it in Asia, others in Africa, and the recent discovery of a supposed connecting

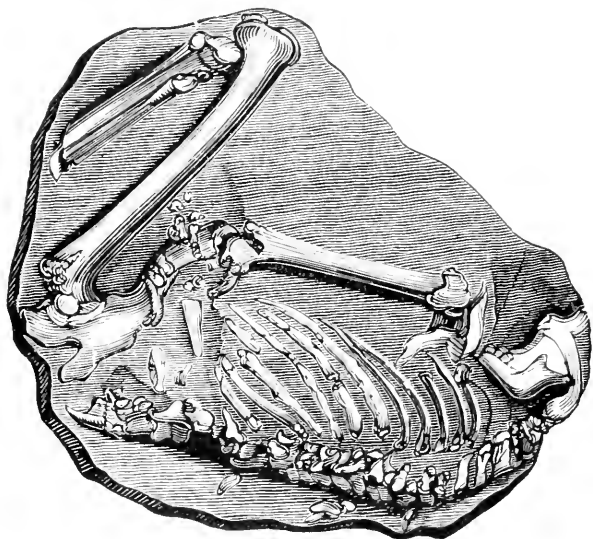


FIG. 190.—FOSSIL MAN.

link between man and the manlike apes has induced many to consider the East India Islands of Borneo, Java, and others to be the original home of man. Eugene Dubois discovered on the island of Java the remains of an animal referred to, which he believes to represent a form intermediate between man and the manlike apes. It is called *Pithecanthropus erectus*. It was found in the beds of the Upper Pliocene. Some authors believe it to be a huge gibbon; others that it is really a link between these forms and man.

What we know positively regarding the antiquity of man is more interesting, and there is little doubt that our common ancestry was a wild and hunting race in the time of the mammoth and saber-toothed tiger and other huge animals, literal cave dwellers, clothed, if at all, in skins, battling with clubs of wood and stone and enabled to kill the big game with their crude weapons on account of their superior intelligence. The proofs of this are interesting. The mammoth was the largest land animal of the Quater-

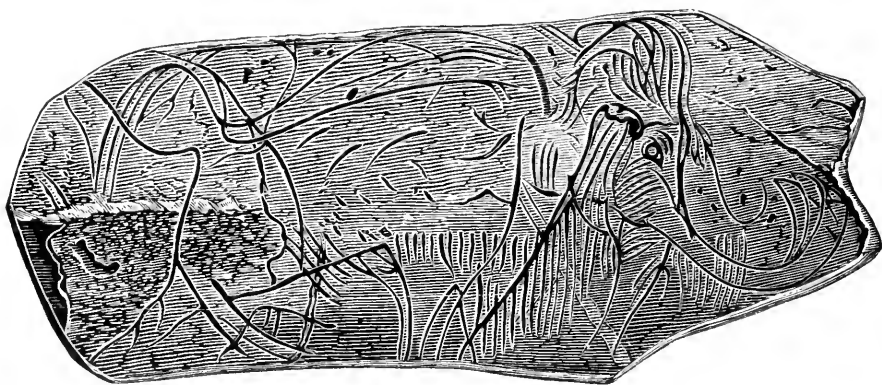


FIG. 191.—BONE BEARING DRAWING OF MAMMOTH, BY EARLY MAN.

nary time, and near Tomsk, in Siberia, the remains of a burned mammoth were found with evidences that men had dined at the feast. Bones have been found in countless localities showing that man existed in his present form ages ago, and that untold periods in the past must have elapsed since his first appearance upon the globe.

The life of the archæologist is a fascinating one, and it is open to all, as, at least, in America, the entire country from Gay Head to Santa Catalina Island on the Pacific coast has been inhabited doubtless for ages and by many peoples. Many of the oldest discoveries have been in the

form of flint implements. These have been found in river beds and banks, in pebble deposits, and in various localities. The young explorer will do well to look in the vicinity of permanent springs in forests, as here natives would camp and live, and here they doubtless would bury certain objects, as stone dishes or mortars, until their return. In this way some interesting implements have been found all over America. The peculiar mounds of the West are supposed to represent the burial places of some of the oldest Americans, perhaps the progenitors of the present Indians. Many men have devoted their lives to attempts to trace the origin of the American Indian. Some years ago Professor A. S. Bickmore showed me a map bearing upon this interesting question. It pictured the North Pacific Ocean, and on it were located the spots where Chinese and Japanese vessels have been picked up—crafts that had been blown away from their own shores, and as they stretched completely across the ocean it was evident that the first Americans may have come from Asia in this way, or they may have crossed at Bering Strait, and when a large collection of North American Indian pictures is compared to a similar collection of Japanese, Chinese, and Esquimaux, there is found to be a strong resemblance. Not only this, but many of the traditions of the American Indians are similar to those found among the Chinese.

One illustration may be given. The Indians at San Juan Capistrano, California, at an eclipse of the moon threw stones at it and beat hides, believing that a dragon was devouring it. A very similar tradition holds in China, and may have been brought over by the sailors of some junk washed on to American shores thousands of years ago.

## XXV. EARLY AMERICANS

Considering the vast age of the earth, the limited information regarding man is remarkable, yet there is every reason to believe that he was highly civilized in various parts of the world many thousand years ago; that civilization waned, and rose again like the tides of the sea, and that our culture of to-day, which is some steps in advance, is but the most recent crest of this wave of intelligence which is sweeping on and making the history of man.

This is well shown in the wonderful ruins of the old cities of Yucatan and Mexico, which in many instances represent the remains of a splendid art, if architecture stands for anything; yet the palaces, castles, and pyramids are overgrown with dense forests or buried in the ground; but very little if anything is known of them, or of the people who built them.

Nearly every country, even Africa, has ruins and antiquities which tell of a former civilization, and the splendid buildings in Italy, in Greece, and on the desert near Cairo, and all along the Nile, show that so far as arts are concerned the people of these lands are in their decadence to-day. In America there are no ruins suggesting a civilization corresponding to that of Europe or Africa, but all over the country evidences of a remote existence are found in mounds, camp sites, and ruins of various kinds. Among the most interesting are the Cliff Dwellers in the south-



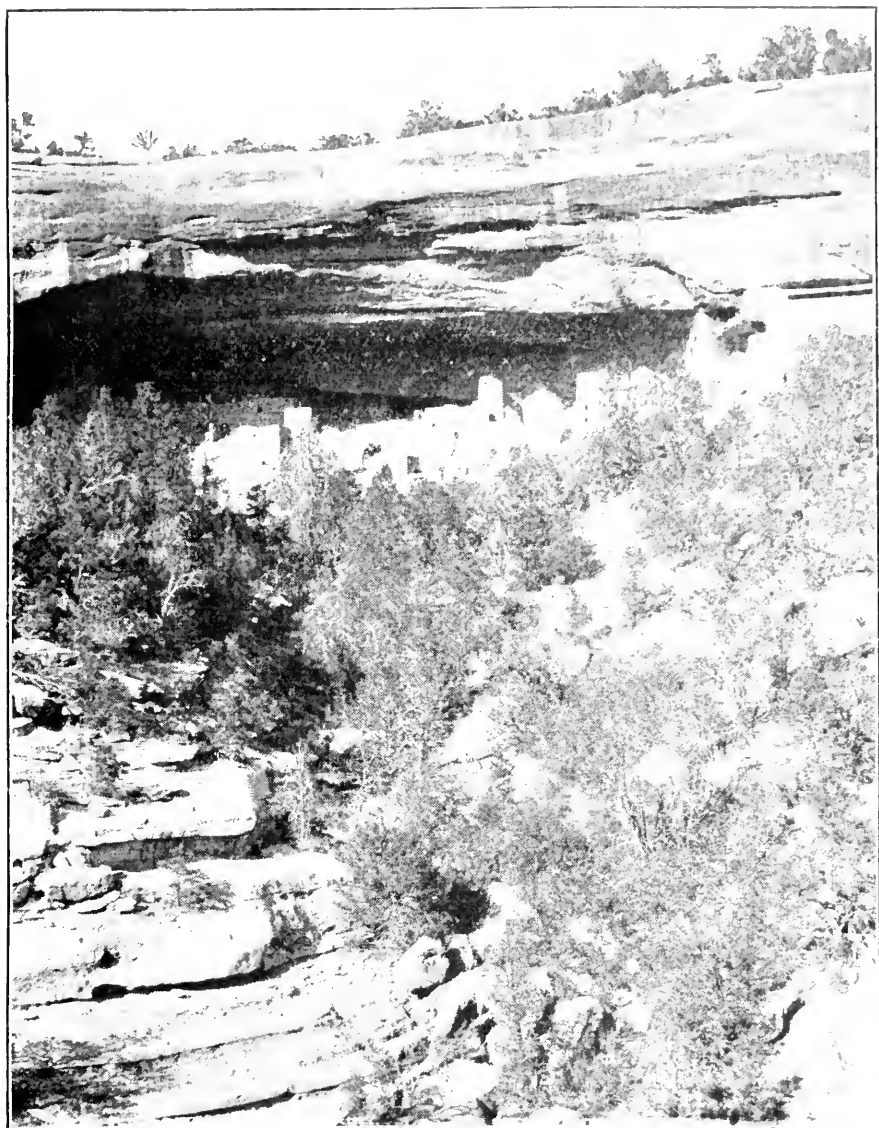


FIG. 192. — CLIFF DWELLINGS IN ARIZONA.

west of Utah, Arizona, and New Mexico. Here in deep canyons are found eyries like birds' nests, clefts in the cliffs having been stoned or built up, reached by ladders or narrow trails. For some reason these homes were deserted,

and they stand to-day among the most interesting ruins of the Southwest. By digging in and about them explorers have found countless articles in stone, pottery, and wood, telling the story of these ancient people, the forefathers probably of the Indians living in and about the Southwest to-day. All over Arizona and New Mexico ruins of some kind are found; some, like the Casa Grande, of large size, and many of adobe show that vast communal towns once stood here, but have been battered down by wind and rain until only the outline remains to be read by the man of to-day. What these old cities were, can be understood only by visiting the wonderful ruins. They are built in lofty places and doubtless look as they did



FIG. 193. — AN AMERICAN INDIAN.

centuries ago. When the *Mayflower* landed at Plymouth, the continent of North America was well populated by Indians; a strong and vigorous people in the main, a dominating race which made a stubborn resistance, but they have been swept away like sand before a flood, and the pitiable remnant on the various reservations tells a striking story of the truth of the axiom that the fittest survives. The red men evidently had reached their highest intellectual plane. They lived to hunt,

fight, and eat, and were no match for the hordes of white men who had in the main higher ideals, and who have

made the forests of the Indians the homes of countless thousands, built great cities everywhere, and crossed the land with numerous steel roads, making possible the spreading out of the ever increasing throng.

Some very interesting localities in which to observe evidences of ancient races are seen on the Pacific coast, especially on the islands. When Cabrillo, the Spanish explorer, visited the coast in 1542, he found evidences of Indians almost everywhere. The smoke from their campfires and villages rose all along-shore, yet to-day, years after, in this same locality, it is not only almost impossible to find a native, but their legends in many cases have become things of the past.

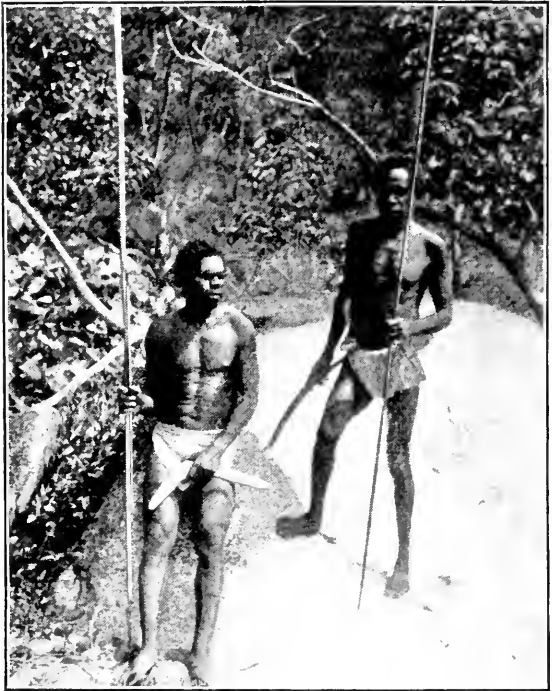


FIG. 194. — AUSTRALIAN BUSHMEN.

The early inhabitants of the Californian islands may be taken as types of early races which had advanced beyond savagery. An example of a true savage, a man of low type, is seen in the native Australian, who has, like the orang, no permanent abode, who wanders from place to place, building a shelter to-night to desert it on the following day, addicted

possibly to cannibalism, using in the main weapons of convenience, as stone and wood clubs, and having little moral sense.

The inhabitants of North America, when discovered by Columbus and his predecessors, as doubtless America was discovered many times by navigators in the last one thou-

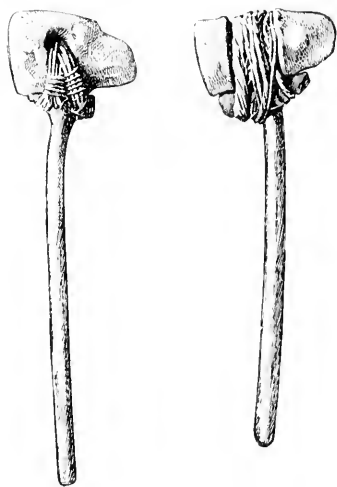


FIG. 195. — NATIVE WEAPONS  
OF STONE.

sand years, were not savages in this sense; they were many grades higher. That they were savage, brutal, cannot be denied; but it is well to remember that our ancestors had no right to land on American soil and force the natives to give up their homes and lands at the point of the gun. The native Americans resisted the white invasion and brought to bear all the horrors of savage warfare to prevent it.

The more ignorant, the more primitive a nation, the more simple their possessions. So we find primitive man living in caves, using stones or clubs as weapons, shells as drinking cups. It was a long time, doubtless, before they discovered the use of metals; there is a long gap between the stone club, the flint chip, and the modern machine gun. Recognizing this fact, students of man have called the time of the earliest man they know anything about, the "Stone Age," or the time when man knew nothing about metal. Then another term, the "Age of Bronze," is given to the period when metals came to be used; and there are

many other divisions, more or less artificial; but these are sufficient for our purpose, as on the islands of the Pacific coast and its mainland shores even up to within a few centuries there lived a race which well illustrated a very intelligent stone age. On the island of Santa Catalina, off Southern California, I have found many camp sites of these people. In the center of the island, on a ridge of Mount Orizaba as it reaches down to the ocean parallel to the Cabrillo Mountains, I found a typical cave of this time. It was beneath a ledge of high rocks, and was large enough to afford shelter to a family of natives. In front of the cave was a huge pile of *Haliotis* shells brought from the sea nearly a mile distant, and on one side I could see where fires had been made against the rock. The small cave was filled with débris and had been occupied by wild goats for years; but on digging in the earth several implements of stone were found, a mortar or bowl of steatite, pipes, and various strange objects in stone. The *Haliotis*, or abalone, was the most important possession. The natives ate the meat, used the plugged shells as cups, and cut it up into a score of beautiful beads and ornaments, even employing it as a mosaic to decorate various articles.

Scattered about were grinding stones, metates, flat mortars, showing that these people had formed from stone, shell, and wood nearly every household article necessary to their purpose. In an ancient graveyard on the island were found beads, pipes, bowls, hooks and lines (seaweed), clubs, paint pots, gouges, sinkers, "good luck" stones, arrow points and spear points, ceremonial stones and many more, all of wood, stone, or shell. A ditch was made,

disclosing four or five layers of ancient graves. These people buried all their household gods with the dead. In the upper graves I found the usual stone implements and bell clappers, Florentine glass beads, quaint mattocks of iron, files, spikes all carefully wrapped in cloth made of seaweed, showing that the graves did not date back earlier than 1542, when Cabrillo, the first white man, arrived and gave them objects in metal; but in the graves lower down no metal was found, suggesting that they dated prior to the whites and represented what we might term the stone age in Southern California, though it must be remembered they were not a low and savage people; but were skilled artisans in stone, shell, and wood.

I visited a native manufactory here, a ledge of steatite or soapstone, and found that the natives had made all the interesting and attractive bowls and other articles found in the graves. Their plan was to cut out a ball of steatite with their stone implements until it stood in relief the size required, then to break it off and to hollow it out at leisure. At Empire Landing, Santa Catalina, can be seen the scars of many of these mortars, and in the adjoining canyon I found mortars in various stages as though started and deserted.

Near here were broken stone implements of various kinds, and in the immediate vicinity many interesting objects were dug up. Not far away I found a ledge of rock where a native arrow maker had worked; scattered about were broken arrowheads and stone chips, telling the story as well as though it had been written in a book. All over this island I found similar places, shell deposits, camp sites, and burnt patches of sand; at Avalon stood a great

graveyard from which tons of vessels and stone objects have been taken, many of which can be seen in the National Museum at Washington. I located many camp sites on this island; also on San Clemente, San Nicolas, and Santa Cruz.

It is well known that all the islands a few centuries ago had a large and vigorous population, and so far as their works are concerned, they were a superior people to many of the Eastern tribes. But in a few hundred years they have been swept away before the relentless march of civilization.

## XXVI. AMERICAN NATIVE RACES OF MEN

The student of mankind soon notices that there are many kinds of men, just as there are many varieties of dogs, pigeons, or horses. There is a wide gap between the fleet greyhound and the common cur, or between the car horse and the trained trotter; and so with man, the mental distance between a George Washington and an Australian chief is great, though physically they are much the same.

It is not necessary to travel to learn that there are many races of men. America has become the refuge of the people of the world. In nearly every town or city we see men strikingly different. Black men from Africa, yellow men from China, red men from America, and whites from the great European centers. These constitute certain types of men, and again we could divide them into many races or groups based on physical peculiarities. Thus Huxley gives five types and fourteen secondary ones; Haeckel gives four types and twelve secondary subdivisions, and there are many more representing a vast number of grades and degrees, and the point of extreme interest is to know how these different kinds of men were produced: whether the first men were black, white, yellow, or red; whether they all came from the same land, or whether they sprang from different places.

These are questions not solved, but about which volumes have been written; but this we do know, that climate has



much to do with man, his appearance and development. The equatorial regions appear to be better adapted for negro types, and high civilization is not, as a rule, found among the denizens of such regions; the heat is too great, possibly, to permit or stimulate mental or physical energy, though in Northern Africa there was once a higher civilization than at present. The finest products of the human race appear to have developed in about latitude  $32^{\circ}$  in Italy, Greece, Germany, Spain, Austria, Hungary; and to thrive permanently in the latitude of England, where the climate is not extreme. In other words, the student of man would be impressed by an examination that climate had much to do with his development. Whether this is so it is not necessary to prove, but the most casual observer will notice that the first great results in human intelligence were produced in countries like Greece and Rome (arts, science, and invention), and it is difficult not to conclude that climate is a very important factor in man's development.

Among the lowest tribes are Australian bushmen, who are slowly dying out. In many of their ancient habits they closely resembled the lower animals. Thus some have no settled abode. They build a rough shelter wherever they happen to be, roam about, have little or no idea of morality, and believe in killing the old and helpless so that they may not become a burden on the community. These people are being driven out by the incoming whites. Another century and they will doubtless be but a memory.

The American races are of particular interest. When the Pilgrims arrived at Cape Cod, they found the entire country peopled by what we call Indians. They were sav-

ages from the Caucasian standpoint, but were intelligent and far above the low Australians. In traveling over the country where the Indians now live, the careful observer easily recognizes different types whose ancestors doubtless occupied North America for thousands and tens of thousands of years; so long that high civilizations may have risen, dwindled, and have been utterly wiped out of existence by relentless time.



FIG. 196.—AN ESKIMO FAMILY.

In the north we find the peculiar Eskimo, or Innuít, habituated to the frozen north, preferring this dismal region with all its discomforts. The Eskimos occupy about five thousand miles along the Arctic Ocean from Northeast Greenland to West Alaska, and they can be traced into Asia. They are rarely found more than fifty miles from

the coast. Their language is about the same in different tribes; their cheek bones are high, the lips thick, stature short, complexion yellow. They have no particular government, no head chiefs, and war to them is unknown. As a whole they are an interesting race that has become innured to a most disagreeable and extraordinary mode of life which many races would consider a living death.

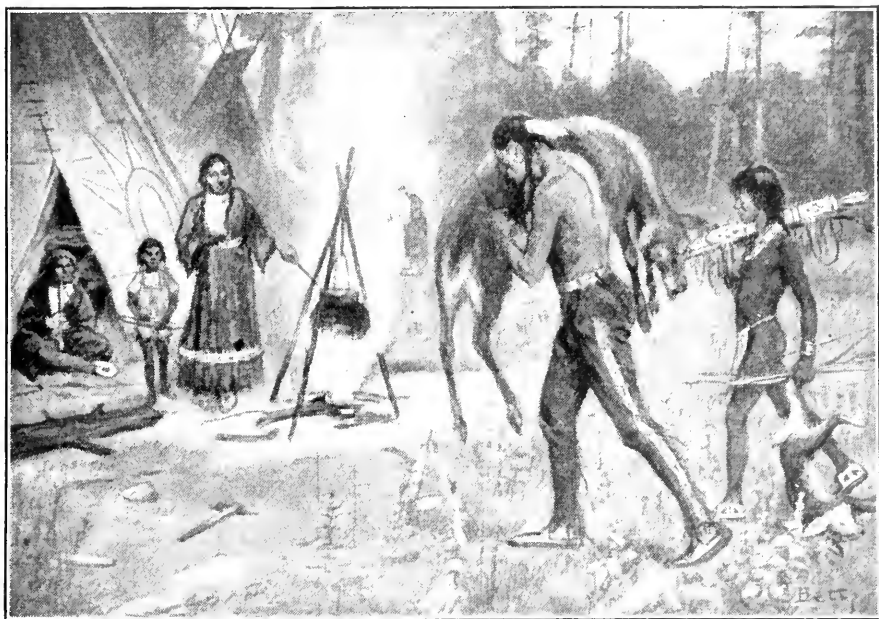


FIG. 197.—THE AMERICAN INDIAN.

The people known as Indians rank much higher and were formerly scattered over the entire continent; the various tribes differ much in language and habit. These tribes fought against the white horde that overran them. With the coming of the whites it was a struggle for home and country. They were the true Americans, the original owners of the soil who went down before the stronger and more intellectual whites who have swept the land and

dominate it — a fate suggested by Cooper in the “Last of the Mohicans” and other tales.

There are to-day but a pitiful remnant of these splendid savages to tell the story. Where the large lake cities now stand the Iroquois flourished — noble examples of so-called savage man, and but a few years ago their canoes dotted many parts of the St. Lawrence, where now the yachts of American millionaires cut the waters.

These people are now represented by several thousand living in the upper Tennessee Valley. What memories the names Oneidas, Onondagas, Senecas, Cayugas, and Mohawks bring up! the famous five nations forming one of the most notable democratic confederacies known in primitive America. Then there were the Tuscaroras, also a part of this clan from farther south. The Iroquois were famous as warriors, intrepid, bold, daring, relentless, only succumbing before countless numbers. In our histories we read of the savage and murderous foe, the Indian that crept upon villages and slaughtered men, women, and children; but the just American will remember that the American Indian had the same right to fight for his home that the Americans would to-day if they were threatened by an overwhelming and persistent force.

In the Southern States the Seminoles lived, now represented by a few individuals living on the borders of the great swamp, and in the Southeast lived the tribes of Apalachi, Choctaw, Chickasaw, and Creek. These, or some of them, were the natives that De Soto met in 1540. To call them savages would be to do them a grievous wrong. Their weapons and vessels display high intelligence. They had hieroglyphic writing, and gold; their various utensils

exhibited artistic taste, and there was a wide gap between them and pure savages; less than twenty-five thousand are left. The Yamasis are entirely gone, while it is doubtful if there is a pure-blooded Apalachi alive. With the Creeks and Cherokees are still found a few Natchez, and along the shores of Calcasien Pass and the immediate vicinity are a few Atakapas. All are passing into history and would be forgotten had they not monuments in the scores of American cities which bear their names.

Several years ago I made some excavations in an old oyster bed on the St. John's River, Florida, now above high-water mark; it was filled with the broken pottery and implements of some of these people, and evidences of their occupa-



FIG. 198. — NATIVE AMERICAN BOWL.

tion are found in every country the length and breadth of the land. One of the notable tribes of early days of the last century was the Dakotas. They owned a vast estate by right of ancient occupation, and they held it by right of prowess and force of arms. The Blackfeet were a fine people, far from being savages, and the reader would do well to read "In the Lodges of the Blackfeet," a volume which throws a new light on these so-called barbarians.

This Indian State of Dakota stood between the Arkansas on the south, the Saskatchewan on the north, and

west to the Rocky Mountains — a splendid domain. They were among the original and early immigrants; they went west ages ago, and some of their people, as the Tutelos of Virginia, the Biloxis of Louisiana, and the Winnebagos, are still represented on the Atlantic coast, these once famous tribes being the ancestors of the warlike Dakotas, who once held sway in the immediate vicinity of the Alleghany Mountains. It is believed that there are forty-two thousand Dakotas living to-day, represented by the following tribes: Assiniboinis, living in the Saskatchewan, the Minetaris of the Yellowstone country, the Omahas of Nebraska, the Ponkas, the Arkansas Osages, the Dakota Hidatsas, and the Crows of Montana.

On the great plains of the West are found the finest types of the American Indian. In the same general country of the Dakotas we find the Pawnees; with them the Wichitas are fine Indians who have become truly modernized. The Kiowans, Comanches, and Shoshones are splendid physical types.

The Indians of the Pacific slope present a most interesting field, due to the remarkable division of language and to the fact that some of them stand at the head of all the American native races in the domestic arts. Alongshore from Lower California to Alaska no less than thirty-nine different linguistic families have, according to Powell, been found, and two hundred years ago almost every prominent village along what is now known as the King's Highway had some more or less pronounced difference in language. Ethnologists recognize three fairly distinct types on the Pacific coast,—the Indians of the Northwest, those of Oregon-California, and lastly the Pueblos. The natives

of the first group comprise some very interesting peoples, as the Tlinkits, of which there are about 6000, the Haidas (2500), the Tsimshians, Wakashes, Chenooks, or Flatheads (12,000), Nez-percés (275).

All these Indians are interesting; some famous for their industry, for their totem poles, their work in silver, bone, and wood, their large and beautiful canoes, and particularly for their remarkable basketry and the evidence of a keen art sense displayed in the ornamentation and shape. The Chenooks are interesting for their peculiar habit of compressing the foreheads of infants with a board so that in the adults the brain is pushed back and the forehead perfectly flat—a remarkable custom, but not more so than the binding of the feet among the Chinese and the tight compression of the waist among some civilized and Christian tribes of the Caucasians.

In the Oregon and California group at least twenty-six linguistic families are found. These are the Copehs, the Pooyoonas, and the Kulanapans, living along the valley of the Sacramento, the Salinas, Maripos or Yokuts (130), the Chumashans, near Santa Barbara, the Hupas, and the few descendants of the tribe which once held forth on the Channel Islands. Farther south we find the Yumas, the Mojaves, the Maricopas, the Seris, and in Arizona and New Mexico the Moquis (2000). There are



FIG. 199.—TOTEM POLE.



FIG. 200. — HOME OF THE MOQUIS.

three distinct languages of the so-called Pueblo cliff dweller stock that are distinct from all others, according to Den-ñiker. They are the Keres (3500), Tanos (3200), and the Zunis (1600).

All these Indians are remarkable for their tribal ceremonies (which are fully described in the United States government reports) and their basketry. In the latter, the California Indians perhaps excel, at least in the estimation of the author, who has a collection of some of the best productions. The baskets from the so-called Tulare Indians are the finest and most beautiful; but the work of the others are almost equally attractive, and thousands have been sold, collected, and spread over the world during the past decade, some baskets bringing several hundred dollars each.



While the fine weaving of the baskets commends itself, the interesting features are the decorations and shapes, which prove that these natives have a remarkable art sense, which finds expression in this way. I have bought baskets from a squaw which might have been molded and designed by an artist, a man of culture; yet the woman was surrounded by all the evidences of barbarism and squalor.

The Indians of Arizona and New Mexico, especially the Navajos and Zunis, are fine types—intelligent, self-supporting, and deserving of respect; but nearly all these native owners of the soil have received treatment from the American people that can only be designated as outrageous. The question has become a national one,—a stain on the flag. This is particularly true

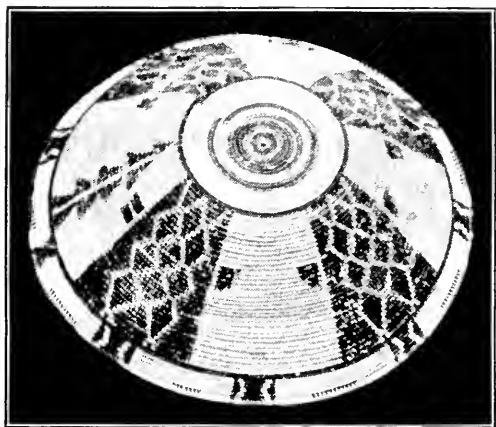


FIG. 201.—INDIAN BASKET (ARIZONA).

of the so-called Mission Indians. When Cabrillo visited California the entire coast was found inhabited by a hardy people who were fishermen and trappers, hunters and traders. They had beautifully shaped canoes, utensils, weapons of stone; in fact, so far as their articles are concerned, they represented the stone age, so called, impinging on the nineteenth century.

In a few hundred years this great series of tribes has been almost wiped out; their graves have been looted and sacked, and all that remains of a once powerful people are

a few individuals living in the canyons of the Sierras, or on desert lands that would be spurned by the lowest white. Every year the people of California are importuned by friends of some of these Indians to aid in saving them from starvation. It should be the duty of every student to post himself upon the condition of these unhappy wards of the nation, and see to it through Congress that they have justice. The government is endeavoring to educate the Indians. Schools and institutions of various kinds have been provided, all intended to render the original owners of the land self-supporting after the American fashion.

## XXVII. ADAPTATION OF MAMMALS TO VARIED CONDITIONS

In glancing at the mammals, or milk givers, from the ant-eaters to the apes, one is impressed by the remarkable variety in shape and habit. Nature has adapted these animals for nearly every possible condition — land, water, or air. In the whales there are the rudiments of hind legs, suggesting that these mighty animals, one hundred feet in length, in certain instances weighing hundreds of tons, may once in some early form have been semi-land animals and, instead of going to sea, lived in shallow water, like the huge rhytina, described by Steller — an animal with the tail of a whale, the body of a sea lion or seal, found living in the shallows of the Arctic Ocean, the last of its race.

But the whale to-day is a sea-going milk giver, suckling its one or two young, having a broad, fishlike tail placed horizontally instead of vertically ; provided with enormous layers of fat to resist the cold of deep water, enabled to hold its breath for an hour if necessary ; in a word, adapted to a fishlike life, and even having a top or dorsal fin in some instances, as in the orca, this fishlike fin being six feet tall.

Theoretically the whale does not need water ; it is an air-breathing animal, has lungs like any mammal, but its nostrils instead of being near the mouth or in front, as in the cow, ape, or horse, are on top of the head — a wonderful adaptation to its water habit. It is as necessary for the whale to breathe air as it is for man, but while man

breathes almost every second the whale breathes at longer intervals, ten minutes, more or less ; the nostrils open on top of the head, so it is only necessary for the whale to rise to the surface, when the hot air from the lungs, the same as the breath of man, is sent out so violently that it throws what water there may be standing over it flying into the air. The hot breath coming in contact with the cold air turns to mist and becomes visible for a long distance, as the "spouting" of the whale. The whales, dolphins, blackfish, orcas, white whale, narwhal, and others, are all examples of mammals adapted for life entirely in the water, but theoretically submersion is not absolutely necessary, as is shown by the fact that white whales have been brought from Newfoundland to New York in cars, wrapped in wet seaweed, and kept out of water several days. They were continually moistened, but with fresh water.

The seal, sea lion, and walrus are mammals adapted to the water in a less degree. The sea lion is perfectly at home here. Its fore arms are whalelike fins ; its hind legs are finlike, especially in the seals, and it is a clumsy creature on land, though it spends the greater part of the time there, lying on the rocks.

Another group of mammals, the rare manatees, appear to stand between the two, so far as their love of water is concerned. They prefer to lie in it, to basking on rocks, as do the sea lions. Other milk givers adapted to the water are the sea otters, perfectly at home in the wild seas of the North Pacific, where they beat in on the kelp beds. Here the otter spends part of the time with its young, swimming rapidly by its birdlike webbed feet.

What a contrast these animals present to the mammals adapted by nature to life in the air as the bats! Physically, they are alike, that is, in structure. They provide their young with milk, are mammals, yet nature has intended them to feed on insects, to capture which the fore arms are wonderfully developed into long, attenuated fingers which serve to brace and spread a weblike wing very similar to that of a bird, their flight being quite as perfect and rapid; indeed, few birds are so skillful, as a bat can avoid the most delicate obstacles in a dark room.

Then we have other mammals, as the flying squirrels, which are adapted for limited flight. They have developed parachutes, a loose skin, which, when they spread their limbs, fill out to a remarkable extent, presenting a surface so broad that it bears up the animal and enables it to make extraordinary leaps, in no sense flying, but yet enabling them to dart from tree to tree and cover long distances in the seeming aerial flight.

The antelope is an excellent illustration of a mammal adapted for life in the open. Nature provides its defense in flight, has given it limbs by which it can outrun all but few other animals. How sharp the contrast between this graceful creature and the hippopotamus, a veritable whale out of water in its clumsiness. Yet nature has not overlooked this uncanny beast and has adapted it for life in pools and rivers in the tropics, where it is singularly active and perfectly at home. It is very difficult to drive a hare, the jack rabbit, into a hole in the ground; it depends upon its long, machinelike legs and its marvelous speed to escape its enemies, even building its nest on the surface and scorning any retreat; but with a short-

legged rabbit it is an entirely different question: it can run only a short distance and then dashes into its hole—a long burrow.

The rabbit, California ground squirrel, prairie dog, jerboa, weasel, the armadillo, and many others live a part of the time under ground. Then we have another class, as the California gopher, the mole, and some others, which may be said to be entirely subterranean in their habit. The California gopher never leaves its home if it can avoid it, and when dire necessity drives it out, it leaves the hole but a few inches, then dashes back, tail first, at the slightest alarm. It feeds on roots which it hunts for under ground, or comes to the surface in tall alfalfa or weeds. Its eyes have become small and its sight is poor, but it is a very wide-awake fellow compared to the mole, which rarely if ever comes out into the broad sunlight of its own volition.

Here we have an almost perfect adaptation to a subterranean life. The fore paws are developed to an enormous extent, and the mole is a digger capable of progressing through the soil at a very rapid pace. Its eyes, from long disuse, are mere beads, and doubtless of no use, the animal's scent as well as hearing being marvelously developed, enabling it to reach worms or grubs in its travels beneath the surface.

The mole is really a beautiful animal. Its fur is as fine as the finest silk. Mark the difference between it and the skin of those other diggers and subterranean dwellers, the armadillos of South America. Here is an animal that might well be called an underground turtle, as it has an extraordinary armor that covers it. Its feet are provided

with long, hooklike claws, and its powers of digging are remarkable. Some are so skillful that they disappear under the ground almost before they can be approached. It would be difficult to imagine an animal more helpless in a tree than the armadillo; it would fall to the ground at once; it is not adapted to such a life as are certain mammals. See how the monkey dashes up from limb to limb. It is so thoroughly adapted to it that it has a fifth hand, the prehensile tail, the latter holding it during a swing across and over space.

Such an animal is at home in the trees, but not more so than the sloth, the queer, mosslike animal that clings to limbs, its body downward, and never or rarely leaves them. Such an animal appears to be a degenerate form which has lost its ability to live a free and wandering life as its gigantic ancestors did ages ago. This animal is a type of inactivity, contrasting sharply with other mammals, like horses, deer, antelopes, greyhounds, and others, which nature has adapted for rapid movements.

Then there are those which can not run, but can make prodigious leaps, as the kangaroo, certain ones having been known to leap over a horse and rider. Singularly, all the kangaroos are found in Australia, a subject in itself of deep interest to the student of nature, suggesting an interesting study as to the origin and geographical distribution of animals. The leaping marsupials have representatives, though not pouched, in America in the little jerboa or jumping rat, and there are several jumping mice with long legs which go bounding along in a marvelous fashion.

In their care of young there is the greatest variety among mammals, a study of intense interest. I had at one

time a family of young armadillos under my observation : queer little creatures almost exactly like the mother. But what impressed me most was the absolute indifference of the parent to the young. If I took a little one away and placed it in the middle of the room, the mother after a while, in her nervous wandering, would run over it, but apparently not recognize it. How striking is the contrast to a cat and her kittens, or a cow and her calf, where the mother is solicitous and watchful, often guarding her young with her life!

In certain low mammals, as the duck mole, the young is hatched from an egg and the minute creature reared in a nest in a tunnel. The young of the kangaroo is hardly an inch in length at birth, and nature provides a pouch in the mother in which the minute animal is placed and kept until it is large enough to care for itself. The mother bat, even the flying fox, carries her young about with her in the air. The opossum is provided with a prehensile tail, and the mother is seen walking about, her back covered with young, their little tails twined about that of the parent. The young whale is born and suckled in quiet bays at first, as the Gulf of California, where the California gray whale makes a savage onslaught on boats that approach the young, and many men have been killed here—victims to the rage of the mother. The hippopotamus holds its big young on its back when in the water. Many mammals build nests in trees, as the wood rat, which also builds on the ground or in it. Nature endows many animals with the faculty of bridging over the foodless season in long periods of sleep. Thus in the North the bears enter a winter sleep. At that time they are very fat, but the snow buries the roots,



and the berries are gone, so the bear sleeps away the winter in a state of hibernation, a sleep common to many animals. The lions, tigers, and big cats have no homes, though some may frequent dens. The deer and antelope and others have no fixed places of abode, roaming about according to the food supply.

The defenses given to animals well illustrate the resources of nature. Note the stupid porcupine covered with menacing bristles that render it almost safe from all animals, the hedgehog, the bands and scales of the armadillo. The skunk has a secretion that renders it safe from nearly all animals, the odor being overpowering; and a number of animals have odors offensive to other animals, rendering them perfectly safe. In the narwhal there is a long, ivory sword or spear that doubtless is a menace. The deer family have splendid horns and antlers with which they attack enemies or rivals. The horse and mule whirl about and attack with the hind legs, while the kangaroo strikes a terrible cutting and downward blow with its knife-like claw sufficient to disembowel a horse or man.

The cat tribe tear with their claws, lacerate with their sharp teeth, leap upon their prey, and bear them down; the hippopotamus opens its cavernous mouth and literally bites boats in two, crushing the occupants with its bark-cutting teeth; and adaptation in infinite variety is found in the varied conditions of animal life.

## XXVIII. THE GAMES OF MAMMALS

Nearly all observers of animal life have recognized the fact that the lower mammals appear to have many points of resemblance to the higher, aside from those which are purely physical. One of the most interesting



FIG. 202. — OTTER SLIDING DOWNHILL.

is that of sport, many animals displaying a love for various pastimes that is only to be compared with the same exhibition in man.

I have seen the sea otter playing a game of tag in the great kelp beds of the Pacific, and careful observers have watched them and seen them toss their young into the air and perform many other tricks which are more or less familiar. Otters particularly delight in sliding downhill. Several will select a hill not very long, but usually steep,

which leads into the water. Stationing themselves at the top, one after the other will go shooting down the slide, evidently in the greatest enjoyment and delight, plunging into the water, to scramble out, repeating the feat time and again. In fact, one so fortunate as to witness the acts would be reminded of a troop of boys engaged in a similar pastime.

The acts of monkeys of all kinds are painfully like those of human beings, and the looker-on is forced against his will to confess that the little animals must think along the same lines as himself, although they may not think so deeply or in the same way. Monkeys are essentially mischievous. They are continually playing jokes upon one another: pulling the tails of their fellows, pushing them from the bar, leaping over them—in fact, nearly all the tricks and pranks attempted by a boy are to be seen in a cage of average monkeys.

Some time previous to the earthquake of San Francisco I stood in Sutro Park, in that city, watching a splendid specimen of spider monkey whose long and remarkable tail was really a fifth arm. Near the monkey, which was clinging to a limb of the tree, was a litter of puppies lying with their devoted and happy mother at the foot of the same tree. As I watched them I saw the monkey crawl down very slowly until it reached a branch just over the puppies. The mother was asleep, hence did not see the long, slender, hairy object which came down like a snake. I watched the animal carefully, fascinated by the cunning displayed. Down it came until the prehensile tail touched the little dogs. It immediately coiled itself about one and up it rose, inch by inch, the puppy perfectly quiet, yet

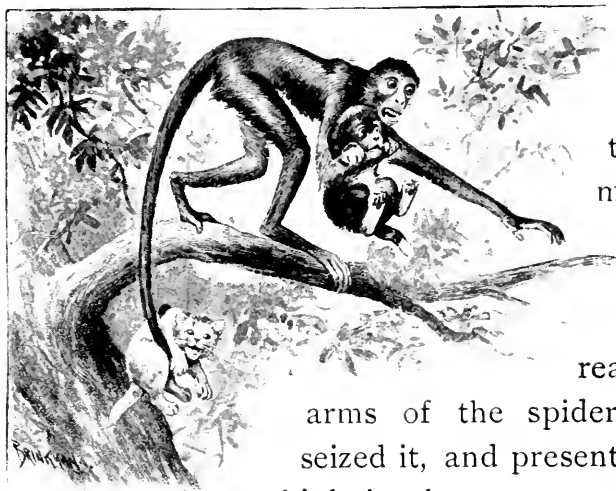


FIG. 203. — SPIDER MONKEY PLAYING WITH PUPPY AND KITTEN.

rising into the air in what must have been to it a marvelous manner. In a few seconds the tail had lifted the little dog within reach of the long arms of the spider monkey, which seized it, and presently the puppy was high in the tree, nor was it dropped, but in a few moments it was carried down and deposited among the others safe and sound.

Dogs are notably playful. They play tag, they race, they pretend to fight, and they really fight, doubtless as a pastime. Dogs will wrestle, roll each other over just as do boys, and by numerous pranks show that they enjoy fun and what we call jokes. The little dogs called whiffets undoubtedly enjoy racing exactly as do human racers. They start at the word and go over a regular course at full speed and display all the eagerness and desire to win that other racers do. This is often seen among horses in a large inclosure. They play like boys, race among themselves, and show abundant evidence of a love of sport and games. This is true of elephants, which have often been seen engaged in cumbersome play.

In all probability the most extraordinary play among large animals has been observed among whales. The largest have been seen to carry on a game which might be

compared to leap frog or something of the kind. I have seen a whale rise slowly out of the water until it appeared to stand fairly on its tail. Other whales will beat the water with their fins, and strike their comrades pats and blows which can be heard several miles at sea with the wind. In Southern waters the crew of a British ship saw a whale hovering directly above them, the huge animal having made a leap, clearing them by ten feet.

Nearly all the young of mammals appear to play games of various kinds. This is particularly noticeable among guinea pigs, all of which recall children in their romps and antics. The adult armadillo is a very sedate and stupid animal, but the very young observed by me were very active and continually engaged in games of chase, hide, or racing. At least their actions recalled these games among children.

## XXIX. THE INTELLIGENCE OF MAMMALS

Probably no question relating to mammals has received more attention than that regarding their intelligence. It is very natural to ascribe to the lower animals the intelligence of human beings, particularly when they apparently perform certain acts which are "almost human"; but to the writer, at least, there is a wide gap between the mental point of view of the elephant and the man, even when both are doing the same thing. It is manifestly impossible to ascertain exactly what the elephant is thinking about, and this applies to all mammals, and the remarkable stories about the marvelous and human intelligence displayed by many animals should be taken with a grain of salt, or not accepted without close investigation by a sane, unemotional, trained observer.

That many animals are very intelligent from our own standpoint is evident, but their point of view is doubtless different, and that any of the lower animals can think out a proposition or carry out any difficult line of thought leading up to a logical conclusion is very doubtful. Thus we hear of mammals committing suicide to escape an enemy; of marvelous examples of skill and cleverness, and if these stories are thoroughly investigated, it will be found that the observer was an "emotional" investigator: he thought he saw certain acts or purposes carried out, but was mistaken. Animals are intelligent, but they have not the perfect intelligence of man.

Among the apes and the monkeys many are extremely human in their ways, and they can be trained to eat and drink, to play upon musical instruments in a crude way, to wear clothes, and to eat with a fork ; the impression is created that the animal thinks exactly as do human beings, but this conclusion would doubtless be far from true. Instinct is frequently confused with intelligence ; nearly all the important and striking acts of mammals are instinctive. Thus a terrible sound is heard : the deer or fawn instinctively dashes away in fear ; but the man thinks it out and concludes that it is thunder, that the danger is miles distant, hence he remains where he is. Nearly all the acts of the lower animals are instinctive. They reason to a very limited degree.

How potent instinct is, is well shown in young dogs and chickens. I have presented a moth to a puppy that took it at once ; but when a bee was shown him he instinctively recognized that there was danger in the buzzing sound, though he had never seen a bee before. I found this was true of young chickens. Some of the most remarkable illustrations given as animal intelligence are animal instinct ; yet many animals can be taught and trained to perform various acts which are very remarkable. No more interesting illustration can be found than the Asiatic elephant, which for centuries has been utilized as a co-worker by man. In the great lumber yards of India elephants are trained to do all the work of a human laborer. They are mounted by a single man, armed with a hook, and they have been trained to obey his every order. They lift huge logs, move them with perfect precision, and appear to understand every wish of their masters ; yet we can hardly accord the

elephant the intelligence of a human being as, had they even ordinary human intelligence, so huge and powerful an animal would resist such abject slavery and refuse to be driven by so insignificant a master as man.

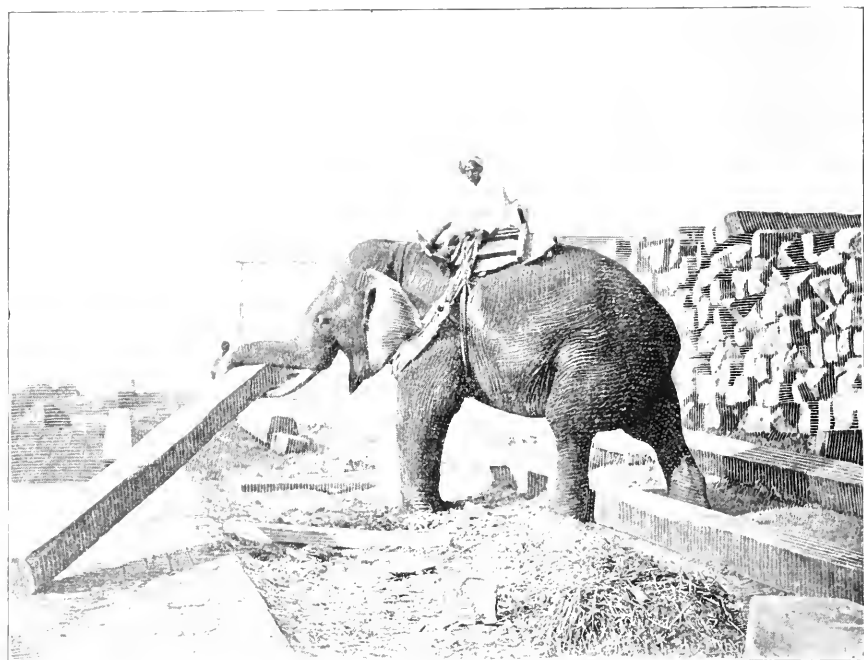


FIG. 204.—AN ELEPHANT LABORER AT WORK IN AN INDIAN TEAK YARD.

The intelligence of the horse is often described, but the horse is really one of the most stupid of animals. It can be trained, but is almost incapable of any judgment. The best of horses when excited will run away, rush into danger, trample its best friend, and play havoc with friend or foe.

The doubtful intelligence of elephants can be understood when they are driven into absurd corrals, which by a concerted effort they could batter down. If we could



see or understand what was passing in the brain of an elephant, we should doubtless appreciate that its range of thought is very limited. The beaver imitates man apparently in cutting down trees, and this, in all probability, is one of the most remarkable examples of intelligence among mammals, as in cutting down a tree the beaver seems to have an object in view beyond the mere act, and to have thought

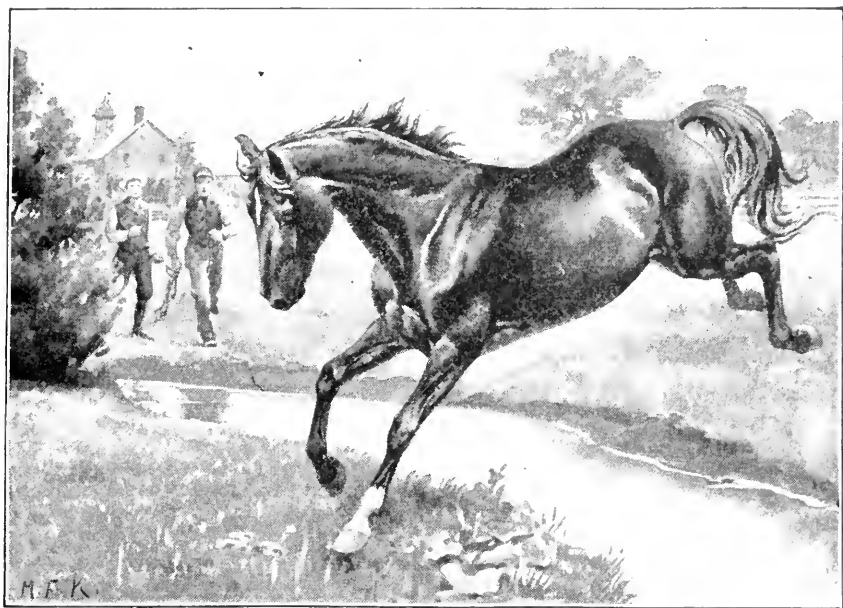


FIG. 205. — AN INTELLIGENT HORSE.

out the act and its results ; that is, it cuts down a tree so that the latter may fall and aid in raising the water in the stream, to cover its house or nest, and afford it protection from various enemies. How much instinct there is in this, how much intelligence, it would be difficult to say ; but beavers have been seen to work on a tree entirely from the land side, not having intelligence to see at once that by felling the tree in that way it would be of no service to them.

It seems a marvelous act for a buffalo cow to recognize its young in a large herd; for a seal to pick out its young among thousands; or for a gull to find its young among ten thousand, but this is instinct, the sense of smell aiding the animals. The sea elephant that will select its young from thousands of others will watch sailors knocking its companions on the head and skinning them, with the greatest indifference, not having the intelligence even to move, or to realize that it is in danger.

In chasing the tree-girdling jack rabbits on horseback in California I have noticed that in nine cases out of ten the hare when hard pressed would turn up grade and easily wear out my heavy horse. This possibly was reason to a limited extent. A friend related the following, illustrating the intelligence of foxes in the Yellowstone Park. A badger lived under my friend's house and on moonlight nights he would come out and go to the garbage pile and eat. Sometimes half a dozen foxes would also come, but when the badger appeared they fell back. Then one of the foxes would rush at the badger and annoy it in every possible way until the badger gave chase, whereupon the other foxes would dash in and tear away some of the food, to be driven off later by the badger. Another fox would now attack the badger, and this clever game was kept up by the foxes until all had dined. In this case the stupid badger was *seemingly* a victim to the more intelligent foxes.

A similar instance was observed at the turkey ranch on Santa Catalina Island. A brood of young turkeys was followed by several ravens. One raven walked boldly up and commenced to hop up and down, attracting the attention of the mother, and as she rushed at the raven another

raven dashed at the young birds from the opposite side and carried one off. This trick was repeatedly played until several of the young turkeys were taken.

These acts appear to be remarkable evidences of animal intelligence, and seem to indicate that foxes and ravens think along human lines. The results were accomplished as described ; but whether it was designed and worked out in the mind of fox and raven, is a question that can not be answered. It may have been entirely accidental on the part of the various animals.

Once in following a hare at runaway speed my horse and hounds slowly gained. The country was a desert ; there was hardly a thing in sight, but suddenly a small bunch of weed appeared. The hare turned about it like a flash of light and ran directly back beneath my horse's feet. This, apparently, was a trick to throw off the dogs and obtain a fresh start. On another occasion a hare, that had led me a long chase, stopped and ran around a large tree, the foliage of which touched the ground. The dogs soon became dizzy, and I called them off, not allowing them to follow an animal capable of playing what *seemed* to be a clever and intelligent trick upon them. But did the hare really try to make the dogs dizzy ? I think not.

Dr. Jordan describes the intelligence of a hare, and I have heard of a similar instance. A hawk, or eagle, was chasing a hare when the little animal ran at a barb wire fence and crawled under from side to side as the bird made dashes at it, so escaping. This suggests intelligence of a high order ; yet the jack rabbit, and the entire tribe, are very stupid in many other ways.

Dogs are often credited with human intelligence.

My father, a physician, often rode to his patients on horseback, accompanied by a little dog. One day he dropped his handkerchief on the road, and when he missed it he turned to the dog and said, "Jollie, I have lost my handkerchief, go and find it." The dog ran back half a mile and brought it. I had a little dog that was very sensitive, and I am confident that he understood what I said to a remarkable degree. To demonstrate this, I would say to the dog, "Moultkie is one of the best dogs I ever had; a true friend, a faithful companion." At this he would wag his tail and display every evidence of delight. Then, without changing my tone, I would say, "but he is getting old, or lazy, and I think we must kill him," whereupon the tail would drop and the little dog would steal away very much dejected until recalled by my laughter.

How much this dog understood is a question, but that he had a limited understanding of English words I have no doubt. Another dog, "Mac," acquired the habit of going to church with the family, crawling into the pew and snoring audibly. When one Sunday came around I told a negro servant to lock Mac up, so that he would not disgrace us. On the following Sunday Mac stationed himself in the road in front of the house, and for the first time would not come when called. He apparently remembered his last Sunday and determined to avoid the disagreeable experience. This dog was a cat fighter. I saw him defeated one day, watched him trot out of the front door, traced him some distance to a friend's, and presently saw him returning with the friend's bull terrier. Mac led the way to the yard, and the combined forces attacked the savage cat with success. Seemingly, this

entailed a long line of thought, almost as much as that of an officer who, defeated, sends, or goes, for reënforcements. But what really passed through the dog's mind no one can say. It may have been an accidental act, which leads



FIG. 206. — AN INTELLIGENT DOG.

me to say that very little is known, or can be known, regarding the question of animal intelligence, as it is manifestly impossible for man to place himself in a position to see what is passing in the mind of an animal, and what we see is easily misunderstood. Enticing volumes are written on the subject, and the student should not readily accept

tales merely because they appear in print. Many honest men and women lack good judgment, are emotional, see things which do not really exist or occur, and are sadly deficient in the power of explaining the acts of animals, imparting to them many traits that would astonish the bear, fox, and others could they read the English language.

I believe that nearly all animals have intelligence which develops in very much the same way and along the same lines as it does in man, where it is supreme. I believe the lower animals which have the same desires, the same appetites and passions as man, possess the same quality of intelligence, — an intelligence produced, evolved just as in man, and differing from human intelligence only in degree. The intelligence of man is more complete, more far reaching, not so circumscribed.

To illustrate, a dog perceived its young master drowning. It rushed into the water and dragged the boy upon the beach and stood over him and watched him complacently as he lay dying. A man who had observed the incident ran to the spot and took up the intelligent act of the dog where it ended, rolled the body, induced artificial respiration, and saved the victim's life. Dog and man were both intelligent and actuated by the same desire to save the boy; but the intelligence of the dog was limited to the one act of dragging the boy ashore, while that of the man comprehended the entire situation and enabled him to save the boy's life.

I believe this simple explanation of animal intelligence and its limitations will explain the entire question. Some individual dogs, horses, birds, cows, monkeys, seals, appear to be especially endowed with intelligence. They are the



FIG. 207.—A DOG SAVES A LITTLE BOY.

“infant phenomena,” the “musical prodigies,” the “boy orators,” “lightning calculators,” of the lower animals. They are “sports,” phenomenal individuals which have by some means been endowed with a greater share of intelligence than their brothers, sisters, or fellows. The human lightning calculators, the infant Greek or Latin scholars, the “child musicians,” are not normal; they are abnormal, freaks of nature, the remarkable gifts being often at the expense of something else.

### XXX. GEOGRAPHICAL DISTRIBUTION OF MAMMALS

How the Mammalia became distributed over the world, and what were the causes of the migrations, constitute an interesting phase in the study of this group. Many works have been prepared in an effort to describe the original "Eden," where mammals first appeared; but the student may spare himself much waste of time in not following up these theories, as nothing is known to-day, or doubtless ever will be, as to the exact region in which the milk givers first made a stand, as it may have been simultaneous in a sense in many different localities.

An instance may be given suggesting the methods by which the migrations of early man are traced. The American Indians, or some of them, bear a strong resemblance, superficially or otherwise, to the North China people, Mongolians. The Eskimos often show a startling resemblance to Japanese, hence it may be inferred that the Indians of our country are the descendants of Asiatic tribes which have wandered east in the remote past. How can this be proved? As I have already mentioned, at the mission of San Juan Capistrano, Southern California, the Indians one hundred years ago entertained a singular superstition that an eclipse was the attempt of a big dragon to devour the moon, so, to frighten it off, they beat dried hides with sticks, threw stones at it, and created noises of various kinds. Now if a belief of this kind should be



found among the Chinese or Japanese, we might assume that it had been handed down for ages. The Chinese have an almost identical belief, and our late minister to China, Mr. Edwin Conger, related to me the details of the attempt to frighten the dragon at the approach of an eclipse. The Chinese, who can calculate eclipses as well as can other nations, went to their temples and performed many singular rites which Mr. Conger personally observed, all of which, together with the creation of noises, was to drive the dragon from the moon. When we also remember that the location of Chinese junks which have been blown from the coast of China during the past fifty or more years has been mapped, and they have been found in nearly every degree of longitude between China and the Pacific coast of North America, we can readily see how one branch of the highest mammal, man, reached America thousands of years ago from China, and became the forefathers of some of the present Indians. This cannot be given as an exact fact, but the student will perceive that on the evidence it is a plausible theory and very possible.

It is the prevailing impression among many scientific men that man originated in Asia and migrated thence, but absolutely nothing is positively known on the subject. He may have appeared in many localities for ages and from several different stocks, gradually migrating over the globe, changing in appearance and language in long eras of time. Since the birth of the first mammals the land has doubtless changed very much. Some has risen from the ocean; vast regions have sunk beneath the sea, and groups have been cut off, isolated, and destroyed, so that to-day we contemplate some singular facts.

As an illustration, America ages ago was the home of the horse and its progenitors, the famous "toed" horses, which have been so valuable in expounding and proving the theory of evolution as understood to-day. In time they became extinct and horses disappeared from America, the first in modern times being brought by the Spaniards



FIG. 208. — A SHETLAND PONY.

when they made their discovery of America in the years following 1492 and the landing of Columbus. From these North and South America have been populated with horses. Many have escaped, and wild horses are found on both continents and all over the world. In Africa and Asia wild horses of various kinds have always been known, and from this stock our present trotters, racers, Shetlands, shire

horses, and others have come, all being the result of careful and intelligent selection and breeding. America, isolated from Asia and Africa, has a fauna peculiarly its own. Here the first white man found the American bison, a splendid animal that constituted the food, shelter, and raiment of many native tribes. Only a few years ago it ranged from the Rocky Mountains to Washington and doubtless to the Atlantic, and from the far North to Texas and the Rio Grande; but in a few years it has been wiped out by the whites, a few specimens only being left to tell the story. Here are found the mountain goat and the mountain sheep, peculiar to this continent, doomed to extinction; also the pronghorn, which once thronged the Western plains in vast bands, with the elk, blacktail, whitetail, and mule deer. These animals lived together in early days and thousands could be seen covering the land as far as the eye could see.

Certain bears, as the grizzly, black, brown, and several species, are peculiar to North America, and many small animals too numerous to enumerate. One of the most interesting forms from its wide geographical distribution is the mountain lion of California, that ranges from Cape Horn to Canada and from California to Florida, appearing under a variety of names in the several localities.

Australia is an interesting region, due to its extraordinary mammals. Here is apparently the home of the lowest forms of the Mammalia, the interesting echidna, and the duck mole, which really lays eggs and has so many seeming affinities with reptiles. Australia appears to have been long isolated from the rest of the world. Here are found all the marsupials or pouched animals with one

exception, the opossum, common in southeastern North America. Here are kangaroos, ranging from giants five or six feet in height down to very small animals, like the wombat and others which are very clumsy on the ground and present a strange contrast to the smaller kangaroos, which can leap over a horse and cover extraordinary distances.

The existence of these strange animals here might well suggest that they originated here and that the familiar opossum with prehensile tail and pouch is merely a wanderer. In South America are found the peculiar sloths, animals that appear to be degenerate forms, living in trees, incapable of rapid motion, clinging to the under side of trees or limbs, and subsisting upon leaves and buds. They are confined to this region and Central America, and in the rocks of the continent are found the remains of gigantic slothlike animals which were the most ponderous and gigantic of all the true land mammals of any time, and at one period they lived in North America. To-day the elephant is confined to Asia and Africa, two distinct species being recognized: the Asiatic form with small ears, so esteemed as an ally to man; and the African form, with large ears, valued principally for its ivory tusks.

These animals to-day have a restricted area, being confined in a general way to equatorial Africa and to certain parts of Asia, as India; but not many thousand years ago elephants had a very wide range and were found almost everywhere, ranging from the hairy mammoths, equipped for life along the Arctic, to the three- or four-tusked mastodon of more temperate regions. There is reason to believe that great herds of these monsters roamed America

and Europe in the early days. This is true of the rhinoceros, now confined to Africa and similar regions. A hairy rhinoceros once lived in Siberia and roamed the shores of the Arctic Ocean, and many died on the New Siberian Islands, which appear to have been a graveyard for mammoths. These animals had a wide distribution, but their living representatives are found only in the restricted regions of tropical India and Africa.

No more interesting phase of the study of the geographical distribution of animals can be seen than that expressed by the comparison of mammals of South America and Africa. They are totally different in nearly, if not quite, all respects. Africa appears to be the home of the negro, the black variety of the human race. Here he has lived and died for centuries and eons, and where he is found in South America or the United States he has been carried as a slave.

South America, about the equator, has very similar climatic conditions, yet there are no negroes; the races found there are allied to the Indians of the so-called red race; and previous to the discovery of the continent by the Spaniard, negroes were not known there.

Africa is the home of the antelope, many kinds being found, from the splendid eland down, the dark continent seemingly being a paradise for big game. Here are the giraffe, the black and white rhinoceros, the water buffalo, the hippopotamus, and other large mammals, the African lion, and many smaller cats; in fact, Africa, of all regions of the habitable world, appears to have been a most favored locality for large wild animals of many kinds, most of them peculiar to the country. South America

presents a remarkable contrast to Africa in this respect. It is comparatively barren, and has no large animals. The jaguar represents the lion; the guanaco and llama take the place of the antelopes, while the only large mammal affecting the waters of streams, after the fashion of the ox, is the tapir, an animal preyed upon by the jaguar and mountain lion, or puma. Indeed, compared to Africa, South America is a vast, gameless region, and to preserve the great game of Africa from extinction, a movement should be undertaken to collect examples of all the African mammals and transplant them to South America, that they may be preserved for future generations.

The adaptation of animals to their surroundings is an interesting study. The mammoth, the musk ox, became gradually habituated to their environment. The reindeer probably slowly became enabled to resist the intense cold of regions most inhospitable. It is difficult to imagine a human being living from choice on shores of the Arctic Ocean, yet there are many Eskimos who live there who prefer it, and do not mind the intense cold. Examples of isolation are not uncommon among animals. The group of huge manateelike creatures known as rhytinas is an interesting example. They were found in Bering Sea a century or more ago, few in number, the only animals of their kind and soon exterminated, represented to-day by their distant allies, the manatees and dugongs, also doomed to extinction. The great sea elephants are found only on Heard Island and other islands in the far South, a few being known on the Pacific North American coast during the past century, now in all probability extinct.

The distribution of the whales has been very extensive.

They are found in almost all seas, wandering about over vast areas; but, as a rule, preferring cool or cold waters. The North Pacific, due probably to its great food supply, is a famous place for them.

How animals become distributed over the globe from their unknown places of origin we know in a general way. Large numbers, as the elk, elephant, buffalo, bison, antelope, porpoise, prairie dog, and others, live in herds, or schools, and range over vast areas in search of food or to avoid enemies. Others, as squirrels and rats, seem to be seized at times with an irresistible and instinctive desire to migrate, and they move on in vast herds, thousands dying on the way, others being left behind to populate new localities; and in this way they have become distributed over the continents and islands of the habitable world.

## XXXI. MAMMALS UNDERGROUND

The diversity of animal life, its adaptability to varied conditions, is nowhere more interestingly shown than in the milk givers that live underground. In America the common mole is an example of what might be termed absolute subterranean life. In all probability no reader of these lines ever saw a mole leave its burrow and take to the open air unless forced. So habituated to its life is the mole that its eyesight has almost disappeared, being, doubtless, of no use. During its underground life it has developed a remarkable sense of smell and touch, enabling it to find worms and insects which are not exactly in its line of progress. By continuous digging it has developed enormous claws or pads by which it moves rapidly along under the surface, tossing up the soil in great ridges and only caught by quick work on the part of the gardener, who often believes that the little insect eater is an enemy to his plants. The mole has a wide distribution, and its habits, its tunnels, its nests, are well known.

In Western America, particularly in California, between the Sierras and the sea, the earth is often completely mined with the tunnels of three mammals, — the gopher, the ground squirrel, and the badger. When, in 1885, I first visited the San Gabriel Valley, nine miles from the city of Los Angeles, riding across the country was sometimes a risk, due to the burrows of a large owl, and horsemen sometimes came to grief.



The gopher is omnipresent here. It is very social, and I have seen a plot of land in Los Angeles, next to a house, perforated with the holes of these animals that rarely if ever came out during the daytime, and even then ventured but a few feet from the hole. They are about the size of rats and there are several species from Florida to California. The California species has large pouches which it will fill with food when it comes out of its hole and thinks it is unobserved ; but it rarely ventures far from the nest and invariably runs back tail first, or backward, when not far from the den. It can be recognized in any region by the mounds it throws up, and for a long period it seems to lie more or less dormant or inactive. Its holes run in every direction and are used by a family, the animal displaying remarkable skill in coming up beneath the roots of plants. I have seen my favorite carnations waving wildly, as though an earthquake was shaking them, then the stalk and flower would disappear, being hauled down into the burrow and eaten. In this way a few gophers will in a short time devastate a garden or destroy the symmetry of a lawn, or eat the roots of a large palm or other tree.

Few animals are more clever than the gopher. A lot adjoining my home has been vacant many years and is filled with their dens. When the weeds die down here in spring the gophers cast longing eyes at my garden and promptly burrow under the fence, coming forty or fifty feet, some digging from across a street to prey upon the flowers. If the gopher threw up a mound here I could quickly recognize its presence and destroy it ; but in eight years' experience I have seldom known a gopher to throw up a mound in my garden, though there may be scores, like

the craters on the moon, in the vacant lot over the fence. The gopher must have some air, so it comes to the surface, gnawing away the earth until it is very thin, then breaks it in so that there is a hole, perhaps not larger than a ten-cent piece ; through this it breathes and watches me.

Rarely in cities, but in the close proximity to towns, is another earth dweller, the ground squirrel. It makes deep burrows and throws up conspicuous piles and heaps of earth, and spends a large part of its time underground, feeding in the grain fields and very rarely climbing trees, and then only small ones. This squirrel is large, and on a place I once rented at a California seaside resort it was necessary to sit out in front of the house to drive them from the lawn, or they would devour it. I have seen a score on the grass at a time, the band scurrying off as I came out. These animals are prolific, have few enemies except owls, hawks, and coyotes, and none near towns, as there is a prejudice, wholly unfounded, against them as food.

Even more interesting is the tree rat of California, one of many found over the United States. It builds complicated nests in trees or against them, and from this tunnels lead away into the ground, where the wood rat passes part of the time, a much greater part than is generally supposed.

The various armadillos are remarkable diggers, often burrowing so rapidly with their powerful claws that it is almost impossible to hold them. The weasels burrow and live in deep holes in California. The little California jerboa is a digger ; and a long list of animals could be given that affect or love the darkness and spend more or less time beneath the ground.

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